73 Amateur Radio Today

JANUARY 1995
ISSUE # 412
USA $2.95
CANADA $3.95
A WGI Publication
International Edition

Hot Home-Brewing

Build A "Tripole"
Easy PTT Control
Cheap Surplus Receivers
Pyramid-Power Antenna

73 Reviews
MFJ Vertical
Heil Headsets
Yaesu FT-840

0 74820 08725 1

|||.|.|..|||..|.|.|.

With ICOM's New IC-281H . . .
It's Not Just 2 M Anymore!

(2 M mobile transceiver *with* 440 MHz receive!)

The ICOM IC-281H Wins ...Hands Down!

See your dealer today and find out why the IC-281H is the industry leader in its class!

New Exciting Features!

Bonus Receive Band – The 430 (440) MHz bonus band is available for receive. Enables full duplex, crossband operation between the 2 M and 70 cm bands. Crossband repeat from 440 MHz to 2 M.

Scratch Pad Memories – 10 scratch pad memories automatically store your 10 previously transmitted frequencies (5 simplex and 5 duplex) for instant recall. No fumbling around trying to write down, or store into regular memories, frequencies which you want to use temporarily.

Memory Allocation Function – 60 regular memory channels can be divided between the main and bonus band. You can organize your memories for maximum efficiency and listening preference.

Automatic Memory Channel Advance – After a memory channel is programmed, the channel indicator automatically advances, speeding up the programming process.

Tone Scan* – Scans, detects *and sets* the subaudible tone. Permits access to a repeater when you don't know the tone frequency.

* Optional UT-85 required.

Voice Synthesizer* – The IC-281H announces the operating frequency, enabling quick confirmation without taking your eyes off the road. Very helpful for visually impaired operators, too.

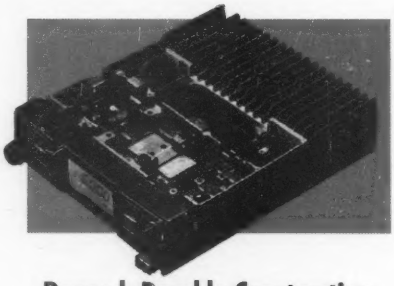
* Optional UT-66 required.

Packet "Plug and Play" Operation

Data Jack – Connects a TNC directly to the modu... circuit for packet convenience.

9600 BPS Capability – No modifications necessary. Provides higher performance packet operations.

Modulation Circuit – Newly designed, prevents over modulation even during high data throughput.



Rugged, Durable Construction

Die Cast Aluminum Frame Construction – Meets the highest standards to provide reliability and long life. Will enhance your trade-in value years later.

Large Heat Sink – Dissipates the heat to maintain power output and stability characteristics.

Simple Operation

Remote Control Microphone – Puts the operation of several functions at your fingertips.

Auto Dialing Capability – Programs 14 telephone numbers for autodial via repeater autopatch.

"One Push" Action Switches – Eliminates the need for "two step" function switch operation. Simplifies mobile operations for convenience and safety.

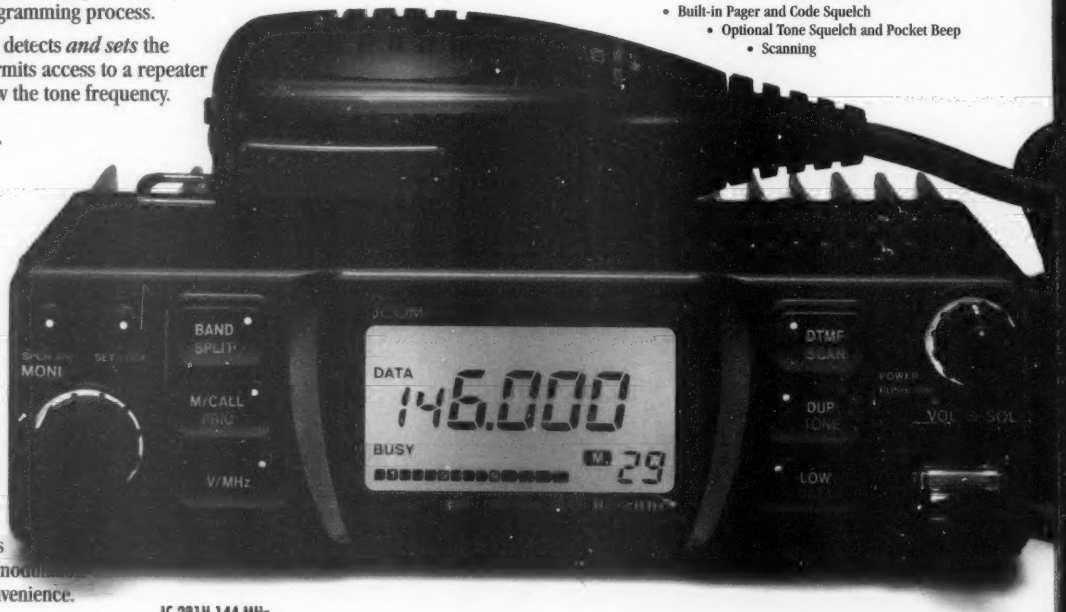
Large Display – Easy to see and logically organized for easy interpretation.

Auto Power Off – Shuts the transceiver down (when programmed). Great for bedside use.

Compatible Accessories – For easy mounting and operation.

And More!

- Built-in Pager and Code Squelch
- Optional Tone Squelch and Pocket Beep
- Scanning



IC-281H 144 MHz FM Transceiver

ICOM America, Inc. Corporate Headquarters:
2380-116th Ave. N.E., Bellevue, WA 98004
All stated specifications subject to change without notice or obligations.
All ICOM radios significantly exceed FCC regulations limiting spurious emissions. The ICOM logo is a registered trademark of ICOM, Inc. 2819947

ICOM®

Call our Brochure Hotline for FREE literature on ICOM radios: (206) 450-6088.

Experience the Quality

CIRCLE 179 ON READER SERVICE CARD

JRC

JST-245

160-10 Meters PLUS 6 Meter Transceiver

Fifteen reasons why your next HF transceiver should be a JST-245. . .

1 All-Mode Operation (SSB,CW,AM,AFSK,FM) on all HF amateur bands and 6 meters. JST-145, same as JST-245 but without 6 meters and built-in antenna tuner.

★ JST-145 COMING SOON ★

2 MOSFET POWER AMPLIFIER • Final PA utilizes RF MOSFETs to achieve low distortion and high durability. Rated output is 10 to 150 watts on all bands including 6 meters.

3 AUTOMATIC ANTENNA TUNER • Auto tuner included as standard equipment. Tuner settings are automatically stored in memory for fast QSY.

4 MULTIPLE ANTENNA SELECTION • Three antenna connections are user selectable from front panel. Antenna selection can be stored in memory.

5 GENERAL COVERAGE RECEIVER • 100 kHz-30 MHz, plus 48-54 MHz receiver. Electronically tuned front-end filtering, quad-FET mixer and quadruple conversion system (triple conversion for FM) results in excellent dynamic range (>100dB) and 3rd order ICP of +20dBm.

6 IF BANDWIDTH FLEXIBILITY • Standard 2.4 kHz filter can be narrowed continuously to 800 Hz with variable Bandwidth Control (BWC). Narrow SSB and CW filters for 2nd and 3rd IF optional.

7 QRM SUPPRESSION • Other interference rejection features include Passband Shift (PBS), dual noise blanker, 3-step RF attenuation, IF notch filter, selectable AGC and all-mode squelch.

8 NOTCH TRACKING • Once tuned, the IF notch filter will track the offending heterodyne (±10 Khz) if the VFO frequency is changed.

9 DDS PHASE LOCK LOOP SYSTEM • A single-crystal Direct Digital Synthesis system is utilized for very low phase noise.

10 CW FEATURES • Full break-in operation, variable CW pitch. built in electronic keyer up to 60 wpm.

11 DUAL VFOs • Two separate VFOs for split-frequency operation. Memory registers store most recent VFO frequency, mode, bandwidth and other important parameters for each band.

12 200 MEMORIES • Memory capacity of 200 channels, each of which store frequency, mode, AGC and bandwidth.

13 COMPUTER INTERFACE • Built-in RS-232C interface for advanced computer applications.

14 ERGONOMIC LAYOUT • Front panel features easy to read color LCD display and thoughtful placement of controls for ease of operation.

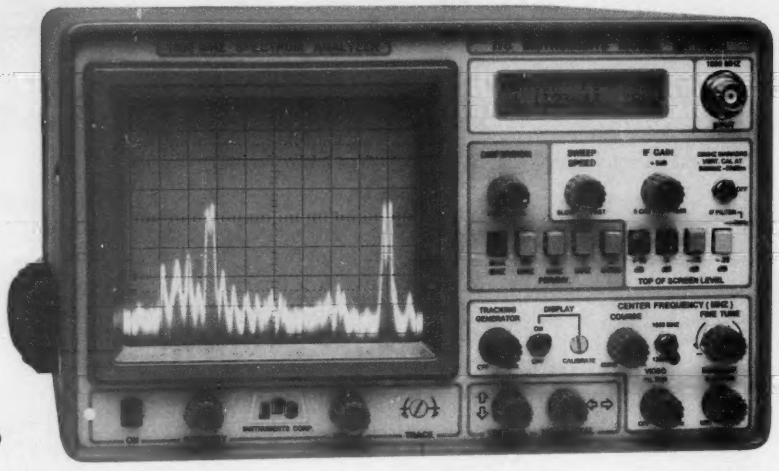
15 HEAVY-DUTY POWER SUPPLY • Built-in switching power supply with "silent" cooling system designed for continuous transmission at maximim output.

JRC *Japan Radio Co., Ltd.*

430 Park Ave., 2nd Floor New York, NY 10022 Phone: (212) 355-1180 Fax: (212) 319-5227

CIRCLE 159 ON READER SERVICE CARD

500 MHz SPECTRUM ANALYZER $895



6" x 12" x 16" (H x W x D)
(only 16 LB)

SA1800C SHOWN
$2295.00

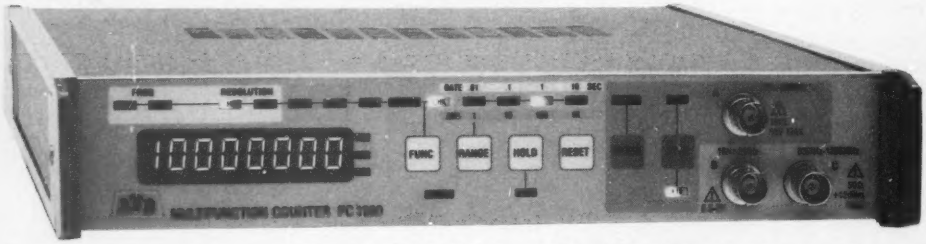
1-1300 MHz *In One Sweep* $1895 MADE IN THE USA

ALL NEW SPECTRUM DISPLAY MONITOR PLUS FULL FUNCTION SPECTRUM ANALYZER

LET THE SA500A SPOT THOSE HIDDEN SIGNALS The **SA500A** easily attaches to any receiver IF output jack. Providing a panoramic signal display of your 1-30 MHz and 30 to 2000 MHz scanner or communication receiver. The **SA500A** is a Professional Spectrum Surveillance Technology Monitor. A Full Function Spectrum Analyzer with +/- 5KHz Narrow Band Filter, Center Freq. Display, 50 MHz Marker Generator. Capable of Tuning Duplexes, Amps, Filters Receivers, Transmitters & Perform EMI, RFI, FCC, Testing. **SA500A** First affordable **Professional Spectrum Monitor/Analyzer** for all serious Ham Radio and Radio Monitoring Operators. just **$895.00**

.2-1.3GHz SA1300B THE ULTIMATE LOW COST ANALYZER **Quality & Performance** that's what **ITC Spectrum Analyzers** are known for. 80 dB on Screen, -110 dBm Sensitivity, Center Frequency Display, +/- 5KHz Narrow Band Filter (for 5KHz resolution band width) 50 MHz Marker. DISPERSION ZOOM, Baseline Clipper, Sweep Speed, Adjustable Video Filter, 40dB of Input Attenuation . Standard on all **ADVANTAGE** Spectrum Analyzer specials. The SA1300B and SA1800C provide Laboratory Performance at a fraction of the normal cost. The **SA1300B $1895.00** -**SA1800C** .2-1.3GHz & .8-1.8GHz **$2295.00.** Add a 1.3GHz Tracking Generator to any unit

1.3GHz FREQUENCY COUNTER .001 ppm



$479.00

ISO9002 CERTIFIED
FIVE YEAR WARRANTEE
REG. PRICE $599.00
SAVE $120.00

Laboratory Performance PROCESSOR STABILIZED OVEN OSCILLATOR .001 ppm

ITC FC1300: ***the first truly*** **Accurate** ***low cost*** **Frequency Counter. Accuracy is the #1 Frequency Counter Requirement.** The $200 - $800 counters being advertised the past few years are but toys when it comes to accuracy. These **guess-so-matic** units are off 5 to 10 PPM over temperature & time (That's +/- 6,000 -13,000 Hz at 1.3 GHz) The **FC1300** is accurate to within **+/-13 Hz at 1.3 GHz 0-40 degrees C. Sensitivity is < 5mV 1Hz to 13 GHz,** 50 Ohm & 1 Meg Ohm inputs, LP filter, 1x -10x input Att. Frequency Measurement, Period Averaging, Time Interval, External Counter, Freq. Ratio, Hold & Reset Functions, 4 Gate times .01 to 10 Sec. Tired of **guess-so-matic** Counters: **Serious About Accuracy:** Ready to step up to **Laboratory Performance Accuracy:** Call Today & **Order**

Call 800-566-1818
To Order or Info.
Free 1995 Catalog
ADVANTAGE
Carries a full line of
Scopes - Analyzers
Frequency Counters
Generators
LCR Bridges & DMM'S

ADVANTAGE INSTRUMENTS CORP. MASTER CARD -VISA - DISCOVER - AMX

3817 S. CARSON ST. # 818 CARSON CITY NV. 89701 Terms: COD - Check - Money Order

702-885-0234 FAX 702-885-7600 Call Toll Free 800-566-1818 - BBS 310-549-0321

PRICES & SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION. F.O.B. CARSON CITY NV. NV. RESIDENTS ADD SALES TAX.

CIRCLE 149 ON READER SERVICE CARD

73 Amateur Radio Today

January 1995
Issue #412

TABLE OF CONTENTS

THE TEAM

PUBLISHER/EDITOR
Wayne Green W2NSD/1

MANAGING EDITOR
Hope Currier

SENIOR/TECHNICAL EDITOR
Charles Warrington WA1RZW

EDITORIAL ASSOCIATE
Joyce Sawtelle

CONTRIBUTING EDITORS
Bill Brown WB8ELK
Mike Bryce WB8VGE
Joseph E. Carr K4IPV
Michael Geier KB1UM
Jim Gray W1XU/7
Chuck Houghton WB6IGP
Arnie Johnson N1BAC
Dr. Marc Leavey WA3AJR
Andy MacAllister WA5ZIB
Joe Moell KØOV
Carole Perry WB2MGP
Jeffrey Sloman N1EWO

ADVERTISING SALES MANAGER
Dan Harper
1-603-924-0058
1-800-274-7373
FAX: 1-603-924-9327

TECHNICAL DRAWINGS
Charles Warrington WA1RZW

GRAPHIC DESIGN
Suzanne Self

GRAPHIC SERVICES
FilmWorks, Inc.
Antrim NH

GRAPHICS MANAGER
Linda Drew

CIRCULATION MANAGER
Harvey Chandler
To subscribe: 1-800-289-0388

WAYNE GREEN, INC.

Editorial Offices
70 Route 202N
Peterborough NH 03458
1-603-924-0058;
FAX: 1-603-924-9327

Subscription Services
1-800-289-0388

Foreign Subscribers
1-609-461-8432

Reprints: $3.00 per article.
Back issues: $4.00 each.

Write to *73 Amateur Radio Today*, Reprints, 70 Route 202N, Peterborough, NH 03458.

Printed in the U.S.A. by Quad Graphics, Thomaston, Georgia.

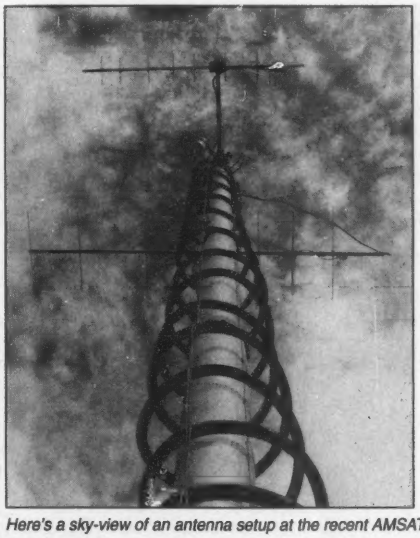
FEATURES

14 The Pyramid Antenna
Harness the power of this 10 meter workhorse. W9CGI

24 Using GE Progress Line Receiver Strips
A low-tech solution for many situations. KI5PGI

32 PTT Control from Receiver Audio
Here's an easy way to key a transmitter for remote or repeater operation.....KB8XI

36 The 80/40/30m Tripole
It's a WHAT?.....W9CGI



Here's a sky-view of an antenna setup at the recent AMSAT Symposium in Orlando. See "Hamsats" on page 42. (Photo by K1MON.)

REVIEWS

10 The Yaesu FT-840 HF Transceiver
Enjoy a simple-to-operate full-featured HF rig.....N1BAC

34 The MFJ-1796 Multiband Vertical Antenna
A lot of antenna in a small package....K7UGQ

41 The Heil Headsets with Boom Microphone
Listen to these quality featherlight units. WB6NOA

DEPARTMENTS

68 Above and Beyond
73 Ad Index
72 Ask Kaboom
66 ATV
81 Barter 'n' Buy
48 Carr's Corner
53 Dealer Directory
17 Feedback Index
67 Ham Help
60 Hams with Class
42 Hamsats
62 Homing In
6 Letters
4 Never Say Die
80 New Products
81 Propagation
56 QRP
8 QRX
46 RTTY Loop
51 Updates
50 1994 Annual Index

FEEDBACK... FEEDBACK!
It's like being there—right here in our offices! How? Just take advantage of our FEEDBACK list on page 17. You'll notice a feedback number at the beginning of each article and column. We'd like you to rate what you read so that we can print what types of things you like best. And then we will draw one Feedback card each month for a free subscription to *73*.

On the cover: Here is Bruce Lamb VE7IUQ operating ATV mobile on the Sonoran Desert. A one-year subscription/extension goes to Bruce in the 73 Photo Search.

FB

Editorial Offices
70 Route 202N
Peterborough NH 03458
phone: 603-924-0058

Advertising Offices
70 Route 202N
Peterborough NH 03458
phone: 800-274-7373

Circulation Offices
70 Route 202N
Peterborough NH 03458
phone: 603-924-0058

Manuscripts Contributions in the form of manuscripts with drawings and/or photographs are welcome and will be considered for possible publication. We can assume no responsibility for loss or damage to any material. Please enclose a stamped, self-addressed envelope with each submission. Payment for the use of any unsolicited material will be made upon publication. Please submit all material on disk as an IBM-compatible ASCII file. All contributions should be directed to the *73* editorial offices. "How to Write for *73*" guidelines are available upon request. US citizens must include their Social Security number with submitted manuscripts.

73 Amateur Radio Today (ISSN 1052-2522) is published monthly by Wayne Green Inc., 70 Route 202 North, Peterborough NH 03458.

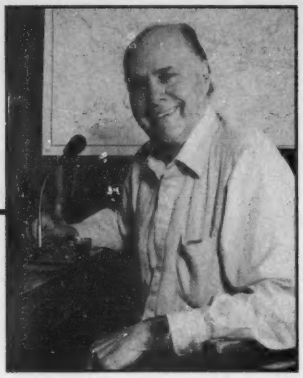
Entire contents ©1994 by Wayne Green Inc. No part of this publication may be reproduced without written permisson of the publisher.

For Subscription Services, write to *73 Amateur Radio Today*, P.O. Box 7693, Riverton NJ 08077-7693, or call 1-800-289-0388. The subscription rate is: one year $24.97, two years $39.97; Canada: $34.21 for one year, $57.75 for two years, including postage and 7% GST. Foreign postage: $19.00 surface or $42.00 airmail additional per year. All foreign orders must be accompanied by payment in US funds. Second class postage paid at Peterborough, NH, and at additional mailing offices. Canadian second class mail registration #178101. Canadian GST registration #125393314. Microfilm Edition—University Microfilm, Ann Arbor MI 48106. POSTMASTER: Send address changes to *73 Amateur Radio Today*, P.O. Box 7693, Riverton NJ 08077-7693.

Contract: Upon reading this agreement, you have entered into a legally enforceable business arrangement whereby you WILL write a report on your latest ham gear and submit that manuscript for publication in *73*.

NEVER SAY DIE

Wayne Green W2NSD/1



I Need Your Help

The two things that readers enjoy reading the most in *73* are simple construction projects and new product reviews. Make that three things by adding antennas to the list.

Charlie Warrington says he's got a darned good review crew, but he can still use a couple more hams with good technical backgrounds and who enjoy writing to try out the latest in new equipment and give us reports to publish.

That's fine, but I'm even more interested in what *your* experience as an average ham is when you buy something new. The next time you buy some ham gear be sure to keep notes and send me a report telling me how it did for you. I'd love to try every new piece of equipment that comes out, but you know, when I had the time I didn't have the money. Now that I have the money, I haven't got the time. Phooey.

So I'm depending on you. One of the most fun aspects of hamming is buying something new and putting it on the air. It's a real challenge to put a solid signal on any band. It takes a good receiver, transmitter, amplifier, and antenna. Every antenna I've put up has a story in it. I'll never forget the two twin-three antennas I hung up at my fraternity house when I went back to college after WWII. They were bi-directional beams hung between the house and nearby trees, and they worked out like gangbusters. Wow, did they put out a signal! My signals were heard first and dropped out last due to their particularly low angle of radiation. They were by far the best antennas I've ever used on 20m, including some very expensive big beams.

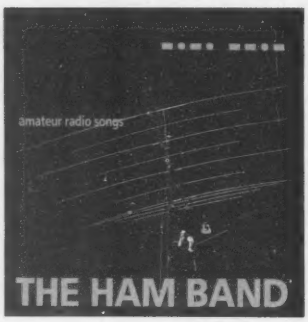
I keep hoping you'll write and tell me what the most exciting thing is that you've done in amateur radio. I've been telling you about mine. Grab your word processor and send me a disk, okay? And don't forget to tell me what you like best about the rig you're using. Don't just sit there mumbling into your D-104, start writing.

Yes, I get a ton of mail. And I read it. No, I don't answer it all, and I don't want any nastygrams about my lack of courtesy in not answering. I write to well-known people all the time and rarely get an answer. Meanwhile I whup out at least a dozen letters a day.

Ho Ho Ho

Yes, kindly Santa, that cheap old codger will be around, nagging you to give presents in his name.Well, it is the time of year to remind friends that you haven't yet won that coveted *QST* Silent Key Award. You're probably expecting me to suggest you take care of this with 12 monthly reminders of your thoughtfulness, namely a gift subscription to *73*, right? Hmm, if I'd thought about it, that would have been my recommendation. I'd have mentioned that I have a choice for you, the el cheapo gift subscription, which is $19.95, or the deluxe gift subscription, which is $24.95. Your choice. They get the same magazine either way. This is just a test of how cheap you are. If you've read any of my travel booklets you know how thrifty I am. Thrifty, not cheap.

There's another gift you might consider for your ham friends. This is the first compact disc of ham music. Ham



music? The songs were written and sung by Andrew Huddleston and Lissa Ladefoged, OZ1ADL and OZ1XY, and they're good. Darned good! There's one on DXpeditions, another on Morse code, and the XYL's lament that he's "Always on the air." Andy says, "I'm not climbing up the tower any more!" There's one about "The Trip to Dayton," where Andrew and Lissa spent their honeymoon at the HamVention. And I loved "Rotuma Bound," another DXpedition song. The music varies from country to soft rock and it's great stuff. Give yourself one of these for Christmas, and then get some for friends. Ham friends, of course. But then, what else have you?

The CD title is "Seek You." They wanted to call it "CQ" but *CQ* magazine threatened to sue them, so they had to change it at the last minute. I wish they'd called it "73." Maybe their next CD will go that route. The disc is by Last Resort Records. You'll be able to buy it direct from Last Resort, or from Uncle Wayne's Bookshelf.

Now, let's get the CD and start sending the digital information on the CD over the air. Yes, it's legal to send music over the air . . . if you do it digitally.

Cold Fusion Update

The researchers in the field are making progress, but no one has yet made a stand-alone cold fusion power generator. My *"Cold Fusion"* magazine got off to a good start with a 100-page first issue, packed with information. The next two issues looked nice, but were short on real information. Frankly, I was disappointed in them contentwise. The third issue, while dreadfully short of new material, won the 1994 Ozzie for the best designed new technical magazine.

Between the weak second and third issues, plus a 90% shortfall on expected advertising and subscription revenues, I decided to to be practical and retrench to a less expensive newsletter format until the field starts to grow. This triggered the termination of my science-writer editor. However, a recent front-page article in *The Wall Street Journal* on the reality of cold fusion may help. As the new editor, I'm up to here in mu-mesons and various cold fusion theories. I've got a crackerjack technical support team, which will help make up for my physicist weakness.

I really didn't need this aggravation at the same time as another financial crisis, but I'll have an interesting blow-by-blow story for you one of these days. I've sure found out who the people are who can be trusted when things get tough and who are ready to take every possible advantage.

The first newsletter format (which ran 32 pages) only triggered two requests for subscription refunds. Most of the mail was congratulatory on the improvement in material, plus the end of the previous editor's absorption with ridiculing the cold fusion foes and with articles about how wonderful the world powered by cold fusion is going to be. A little of that stuff goes a long way. Now we're concentrating on trying to figure out why researchers are getting all that anomalous power. If you're into physics or electro-chemistry, you'll enjoy the publication. But you'd better bone up on your quantum mechanics.

The 5th issue is a corker and more good material is coming in regularly, just as I expected. The original subscription price was $98 a year. I offered a special charter rate of $58 for the first four issues, but now it's back up to $98. For anyone interested in research every issue is worth more than that. If any *73* readers are interested, I'll continue the $58 subscription rate for you. Just menion Wayne's special offer.

There are two other newsletters in the cold fusion field, *Cold Fusion Facts,* which is quarterly, $46 a copy (12 pages) and $120 a year, and *Fusion Facts,* monthly, $30 a copy (24 pages) and $300 a year. At $98 per year and $10 a copy (32 pages for #4), *"Cold Fusion"* is a bargain.

A Quote from *Forbes*

In a *Forbes* column by Peter Huber last year he discussed the effect technology is having on us. For instance, when I was young we spent a lot of time in school on penmanship. Well, handwriting was how one communicated then. Typewriters were too expensive for most homes and typing wasn't taught in school. Once typewriters were cheaper, the need for good penmanship disappeared. So did good penmanship.

Spelling was a big daal when I went to school. Now it's handled by my word processor, which catches my errors. Peter suggested that before long making kids memorize all the irregular spelling rules will be like making radio engineers learn the Morse code. Heh.

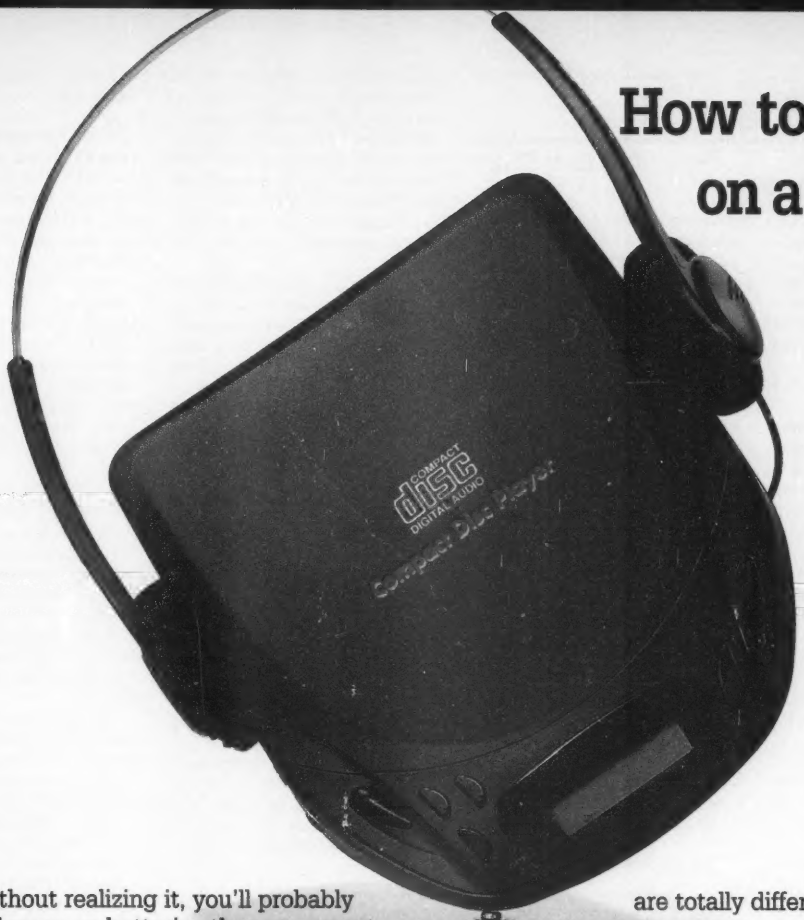
We'll soon have automatic language translation, and computers with voice input. Look where we are with bar-code and checkout counters which add up the items, calculate the change due, debit the store inventory, and presumably even automatically add in a few cents here and there to pad your bill and improve the store's profits. Fast-food cash registers have pictures now instead of numbers, which is handy since fewer and fewer kids are being taught how to make change, and many are reading-challenged.

There used to be a good reason for memorizing the multiplication tables. Now, with calculators cheaply available, that's almost as antiquated a need as learning the code.

If you're into video you can have a complete video production lab at home and do what used to take millions of dollars in equipment all by yourself. In audio, DAT recorders are under $1,000 and outperform a whole studio full of gear from a few years ago. Gas stations let you pump your own and pay with a credit card, with no attendant

Continued on page 74

How to save $150 on a CD player that costs $100.



Without realizing it, you'll probably spend more on batteries than you spent on your portable CD.

So it pays to switch to Rayovac Renewal – the only alkaline batteries made to be reused, 25 times or more.

Don't confuse Renewal with yesterday's rechargeables. Renewal batteries are totally different. They're alkalines, so you get more life – more music – from each charge. And the Renewal Power Station™ makes charging hassle-free.

With the money Renewal saves you on batteries,* you can put something even better in your CD player – more CDs. ***SMART MOVE***

RAYOVAC®
RENEWAL®
REUSABLE ALKALINE™

©1994 Rayovac Corporation

Call 1 800-237-7000 for more information.

*Savings depend on your device and how you use it. Frequent charging maximizes savings.

MAIL-IN REBATE | EXPIRES FEB 28, 1995

Save $10 to start

RAYOVAC® RENEWAL® REUSABLE ALKALINE™

Get $10 back by mail on your purchase of any Renewal Power Station and 3 packages of any Renewal batteries.

To receive your rebate, enclose dated cash register receipt with purchase price circled, and proof of purchase (1 Power Station and 3 battery card UPC symbols and numbers).

Mail to:
Renewal Rebate Offer
Dept. AR-02
P.O. Box 7237
Osseo, MN 55569-7237

Name _____

Address _____

City _____ State _____ Zip _____

Only this official form and original UPC and original cash register receipt accepted, no facsimiles. Offer good only in U.S.A., void where prohibited, taxed or restricted by law. Mail-in offer only, not for store redemption. Offer is limited to one response per family, group, organization or mailing address. P.O. boxes without street addresses will not qualify as mailing addresses. Multiple submissions will not be acknowledged. **Request must be postmarked by Feb 28, 1995. Limit: 1 rebate per mailing address.**

LETTERS

Number 2 on your Feedback card

From the Ham Shack

Michael Farrar VE3WMF, Richmond Hill, Ontario, Canada Dennis D. Powers ("Letters," November 1994) and many others make the statement that the CW requirement somehow weeds out those who have not "demonstrated some commitment to both themselves and the hobby." Supposedly, this commitment through the knowledge of CW will maintain its high standards.

If this is the case, then Mr. Powers would explain to us why the HF bands are rampant with aggressive, ill-mannered and abusive behavior. Where we have interminable racist, sexist tirades by redneck ya-hoos who, no doubt, have mastered CW at the highest required speed, but have not mastered the requirement to ID at the end of each transmission or every 30 minutes. Standards? What standards? I'm a No-Code Tech (VE variety), and I think I have a very strong commitment to the hobby. I do not want to see it die or, in fact, commit suicide, which is what it is doing by clinging to CW.

The CW requirement is going to be the death of the hobby. As long as we are perceived as a bunch of "old geezers" we are going to continue to lose spectrum, and as long as we keep CW as a requirement, then we remain "old geezers." Eventually we might end up with only the 30 meter band (it is a CW band, so all will not be lost.)

Tom Ewing VR2GO/WH6GC, Hong Kong To whom it may concern: I was shopping for simplex repeaters over the last few days, when I called a North American distributor for information and availability on a particular unit. When this vendor asked where I was calling from, I told him Hong Kong, which brought laughter and disbelief from the vendor. "It's impossible . . . I can't hear the delay in the phone line." Well, sir, you were wrong, and by basically calling me a liar you have succeeded in losing a sale.

Vendors, please wake up and utilize some basic PR skills.

Ronald T. Cyre KE4QWP, Jacksonville FL Wayne, I believe we have seen the end of the free licenses for ham radio operators. The reason: money. There are only 400,000 hams. If they charged $10, the FCC would have 4 million more dollars than they have today. Licenses would be renewed every five years, not 10.

I am not opposed to the fee, if we get something for it. I figure we are going to lose more frequencies and parts of bands, and have more band sharing as the FCC gets money-hungry. Do not depend on our friends (fellow hams) in the FCC; they all have bosses who want to keep their jobs and their fiefdom of employees.

I believe that in this day and time the fee is justified. I would hope that you would see the value of a fee. But negotiate something for it; world frequencies will be changing. Our future is not in HF, but in UHF and above. I hope the CW guys can see the future. We need CW and do not want to lose it, but they are chipping away at our UHF and GHz areas. (From a new ham.)

Ron, the government doesn't work that way. You haven't been reading my editorials! Tsk. When the FCC levies license fees the money goes directly into the Treasury, not to the FCC. And every time there is a new source of money into the Treasury, Congress salivates and bargains among themselves as to who will get it for their local pork projects, with the old-timers being first on the pork list. The FCC won't even get a smell of the bacon or a taste of a pig's knuckle. The only way I can see for amateurs to "pay their dues" these days is to recruit a million or two young hams. This will (a) give us a stronger voice when Congress decides to sell off more frequencies, and (b) will generate enough high-tech career scientists, engineers and technicians to pay the rent . . . Wayne

Jim Kornacki KD4WYS, Jackson SC Wayne, let me introduce myself. I was born in Connecticut and raised by Mom W1UBM and Dad W1YOC. I still have both original parents (a rarity today). I moved to South Carolina in 1990 when I left the Navy after 10 years for a real life. Up until this time I had absolutely no interest in radio at all. Then one day I began to feel a little guilty about not having carried on the family tradition of wireless. A week later, thanks to the miracle of the No-Code Technician license, I did the folks proud. Then a really strange thing happened: I started to get into this radio stuff!

To make a long story short, I'm having a blast with the new-found hobby. I consider myself a Plus in the ham community, always wanting to try new things, and doing my best to tolerate the Minuses. In the past 18 months I've worked all states on 10 meters, upgraded to Advanced Class, worked stations via satellite, racked up a lot of DX, participated in contests, served on the Board of Directors of the local club, coordinated this year's Field Day effort, and volunteered my time to various community service events.

I've recently decided to try my hand at QRP operating. Why? Because it's something new, it's challenging, and it will get me away from all the Minuses who have staked out their territory on the SSB portions of the HF bands. I received a nice welcome to the 75 meter phone band when I tried to say "hi" on the local shoot-the-breeze frequency and all I got in reply was a "K4" making fun of my callsign. I've since done a lot of listening and it seems that "he who holds himself in the highest esteem" on the air is usually the biggest jerk who contributes nothing to the hobby. On the flip side, you couldn't find a better bunch of folks than those operating in the Novice portion of 10 meters. Anyway, imagine my joy at seeing the October issue dedicated to QRP. Good timing!

By the way, I read all three ham magazines because I like to know what's going on. They're all pretty good, and each has its strong points. I like your editorials ("Whadaya Read?" had me laughing out loud), and the article on building the simple 10 meter QRP rig was cool.

I'd like more help on building stuff because I'm not much of a builder. Seems like every time a hammy mag offers a simple project to the ignorant non-builder it's an antenna or some stupid gadget I would never use. Useful things, like radios, are fairly complicated and presented all at once. This tends to overwhelm and discourage me. Maybe you can take a "simple" rig and present it in smaller, easier-to-handle parts, with some explanation as to why this thing needs to be done instead of just "what to do." I remember hearing about a book that was written like that, where you built different components and they would all work together later on. There seems to be a giant gray area between learning all the electronic theory associated with radio and actually applying it.

Red Costlow W7GXR, Scottsdale AZ Wayne, I really enjoy *73*, mainly for the construction articles. Though my eyes are weak and my hands not that steady, it still makes me salivate to see the neat articles. I also enjoy your column. I don't always agree, but you sure do stimulate the gray matter.

I have been a ham since 1948 as WØQQM in Minneapolis, W8DNR in Dayton, and my present call here. I am retired and live in an apartment. The manager here is a ham and is letting me put up my R7. I am also laying a Delta Loop from *73* on the flat roof. I may have to go to QRP as some of the tenants here do not have cable and I know that I will probably get into some sets. I have a Heath SB 1400, an Alinco DR 110, and an MFJ-1278 TNC. I am still very green on the digital stuff. My computer is a 486 made up of scrounged boards and parts.

My pet peeve is the heavy emphasis on contesting. I have no argument on contests, as I used to be into that. What I do object to is that just about every weekend there is one that runs for the entire weekend. With the equipment we have today, automatic ID, etc., and scores of a billion, something is wrong. I would like to see some restrictions. Why not force all stations to operate QRP and find out what real contesting is all about? I know I am wasting my breath. I just want to get on and chew the fat. No, not about my rigs, etc., but about what my contact does, hobbies, books, music, photography, and on and on.

Keep up the good work and keep raising hell!

Russ Streeper WA4BWB, Lynchburg VA I have never written before but just had to drop you a note to tell you how much I enjoy *73* these days. I have been an on-again, off-again subscriber over the years, totally dropping out when your involvement declined, only to subscribe again a couple of years ago. I had been purchasing your magazine at the newsstand and realized that all of the good antenna projects and most of the useful information I was gathering about the hobby was coming out of *your* magazine. I therefore promptly subscribed with one of your multi-year incentive plans.

The thing that squeezed the trigger and made me write was your editorial in the October issue. As much as anything, I get your magazine for the access to the thought-provoking experience and perspective that you have developed over the years. Portions of your editorials have been used to advise my children and inspire my wife. The October issue is in a class by itself, however.

I don't think there is another editor in America who covers as much ground (recipes to ICs) as you in a fashion that is a joy to read and think about. Thanks for being much more than a "ham."

For my part (along with the other boys in our commercial radio shop), you do a great job of keeping us current on technical stuff, too. "Carr's Corner" is well-read here for the "street-wise" applications of the latest micro goodies. His columns, like *73* itself, show us how to put things into action.

Let me propose a thought: Ham radio is a valuable resource for children. My kids have packet friends in England and exchange messages and all kinds of information about our two cultures, governments, etc., as a direct result of my involvement in ham radio. It takes a willing ham at the other end of the mike (or key), but the effort can have a big payoff. I have had a few hams from other parts of the world stay in our house. It has been an enriching experience for all of my family. Kids learn about the reality of life in other parts of the world. You can't buy experience like that they get this way! It helps them in school in ways you wouldn't imagine. This type of ham experience lasts much longer than the joy of a new QSL card, in my opinion. Human experience is a valuable thing. Kids, as part of a ham family, have direct contact to this resource worldwide. This has been a great selling point in getting a SAREX program going with the local school system, in conjunction with Lynchburg Amateur Radio Club.

Wayne, you should get an "at-a-boy" award of some type for stimulating our interests. Really, people do read and enjoy your magazine. Some, like me, don't care for the politics of a hobby, but there is a lot to consider between the pages of *73*. Keep up the good work for a very long time. We'll be happily reading the results.

You get more features for your dollar with the

REP-200 REPEATER

A fully microprocessor-controlled repeater with autopatch and many versatile dtmf control features at less than you might pay for a bare-bones repeater or controller alone!

Kit $1095; w&t only $1295!

- Available for the 143-174, 213-233, 420-475, 902-928 MHz bands.
- **FCC type accepted** for commercial service in150 & 450 bands.
- **Six courtesy beep types**, including two pleasant multi-tone bursts.
- **Open or closed access autopatch, toll-call restrict**, auto-disconnect.
- **Reverse Autopatch,** two types.
- **DTMF CONTROL:** over 45 functions can be controlled by 4-digit dtmf command, via radio or telephone.
- **Owner can inhibit** autopatch or repeater, enable either open or closed access for repeater or autopatch, and enable toll calls, reverse patch, kerchunk filter, site alarm, aux rcvr.
- **Change** cw speed and tone, beep delay, tail timer, and courtesy beep type **at any time** by owner password protected dtmf commands.
- **Auxiliary receiver input** for control or **cross linking repeaters.**
- Color coded LED **status indicators.**

NEW **REP-200T Voice Message Repeater.** As above, except includes Digital Voice Recorder. Allows message up to 20 sec. to be **remotely recorded off the air** and played back at user request by DTMF command, or as a periodical voice id, or both. ..... **kit $1145, w&t only $1395**

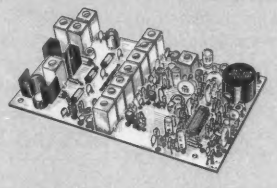
NEW **REP-200C Economy Repeater.** Like REP-200, except uses COR-6 Controller (no DTMF control or autopatch). Features **real-voice ID.** ..... **Kit only $795, w&t $1095**

REP-200N Repeater. Want to use your ACC controller, etc.? No problem! We'll make you a repeater with rf modules only. ..... **Kit only $695, w&t $995**

XMTRS & RCVRS FOR REPEATERS, AUDIO & DIGITAL LINKS, TELEMETRY, ETC.

Also available in rf-tight enclosures, and with data modems.

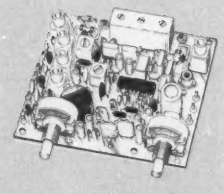
FM EXCITERS: 2W continuous duty. TCXO & xtal oven options. ***FCC type accepted for com'l high band & uhf.***



- **TA51**: 50-54, 143-174, 213-233 MHz .....kit $109, w&t $189.
- **TA451**: 420-475 MHz .....kit $109, w&t $189.
- **TA901**: 902-928 MHz, (0.5W out); w&t $219.

VHF & UHF AMPLIFIERS. For fm, ssb, atv. Output levels from 10W to 100W. Several models starting at $99.

FM RECEIVERS:



- **R144/R220 FM RECEIVERS** for 143-174 or 213-233 MHz. **Sensitive** front end, 0.18uV, both crystal & ceramic if filters plus **helical resonator** front end for exceptional selectivity: >100dB at ±12kHz (best available anywhere!) Flutter-proof hysteresis squelch; .....kit $149, w&t $219.
- **R451 FM RCVR,** for 420-475 MHz. Similar to above. ...kit $149, w&t $219.
- **R501 FM RCVR,** for 902-928MHz. Triple-conversion, ...$169, w&t $249.
- **R76 ECONOMY FM RCVR** for 28-30, 50-54, 73-76, 143-174, 213-233 MHz, w/o helical res, if selectivity >100dB at ±12kHz .....Kits $129, w&t $219

NEW **R76 MONITOR FM RCVR** Kit for 10M, 6M, 73 MHz, 2M, hi-band, or 220 MHz. IF selectivity 60dB at ±12kHz. Great for monitoring repeaters, amateur calling frequencies, or packet radio frequencies, and for listening to commercial two-way radio, police/fire frequencies, or weather forecasts. **Good starter kit, too;** easy to assemble and align. .....**Kit only $59!**

- **R137 WEATHER SATELLITE RCVR** for 137 MHz. Special if filters tailored for wideband fm. Lowest cost receiver available .....**kit only $89, w&t $149.**
- We also have preamps and receiving converters for 137 MHz, and we carry the *Weather Satellite Handbook* by Ralph Taggard.

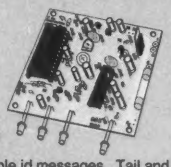
ACCESSORIES

COR-3 REPEATER CONTROLLER. Features adjustable tail and time-out timers, solid-state relay, courtesy beep, and local speaker amplifier. .....kit $49

CWID. Diode programmable any time in the field, adjustable tone, speed, and timer. .....kit $59

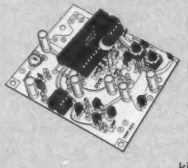
COR-4. Complete **COR and CWID** all on one board. CMOS logic for low power consumption. EPROM programmed; specify call. .....kit $99, w&t $159

NEW



COR-6. COR & Real Voice ID on one board. Digital ic records up to 20 seconds of your voice. Can record multiple id messages. Tail and time-out timers, courtesy beep, solid-state relay to key transmitter. kit $99, w&t $149

Versatile DVR-1 DIGITAL VOICE RECORDER Module. As a **voice ID'er for repeaters**, records your voice, using the built-in microphone or external mic. Just the thing for **fox hunt** xmtr id! May also be used as a **contest caller** to play back one or more messages through your transmitter at the press of a switch. Used as a **radio notepad,** it can record the audio output of a receiver — up to 20 sec. of anything you might want to recall later.



Play back as often as you like through a small external speaker. Extensive manual tells how to use multiple messages and adapt to many applications. .....kit $59, w&t $99

TD-4 SELECTIVE CALLING Module. Versatile dtmf controller with 1 latching output. Mutes speaker until someone calls by sending your 4-digit tt code. Or use it with a long tt zero digit to alert anyone in club. Also may be used to control autopatch or other single device. .....kit $49, w&t $79

TD-2 DTMF DECODER/CONTROLLER. 16 digits, programmable, toll-call restrictor. Can turn 5 functions on/off. .....kit $89, wired & tested $149

AP-3 AUTOPATCH. Use with TD-2 for repeater autopatch. Reverse patch and phone line remote control are std. .....kit $89, wired & tested $149

AP-2 SIMPLEX AUTOPATCH Timing Board. Use with above for simplex operation using a transceiver .....kit $39

TD-3 SUBAUDIBLE TONE DECODER/ENCODER. Adjustable for any tone. **Especially for repeaters,** with remote control activate/deactivate provisions .....kit $29, wired & tested $59

DATA MODEMS

MO-202 FSK DATA MODULATOR & DE-202 FSK DEMODULATOR. Run up to 1200 baud digital signals through any fm transmitter & receiver. Radio-link computers, telemetry, etc. .....kit ea $49, w&t ea $79

9600 BAUD DIGITAL RF LINKS. Low-cost packet networking system, consisting of MO-96 Modem and special versions of our 144, 220, or 450MHz FM Transmitters and Receivers. Interface directly with most TNC's. Fast, diode-switched PA's output 15 or 50W. CALL.

Low Cost GaAsFET PREAMPS

LNG-(*)

ONLY $59 **wired&tested**

FEATURES:

- **Very low noise:** 0.7dB vhf, 0.8dB uhf
- **High gain:** 13-20dB, depends on freq
- **Wide dynamic range** - resist overload
- **Stable:** low-feedback dual-gate FET

**Specify tuning range: 26-30, 46-56, 137-152, 152-172, 210-230, 400-470, 800-960 MHz.*

LNW-(*) MINIATURE PREAMP

ONLY $29 kit, $44 wired&tested

- GaAs FET Preamp similar to LNG, except designed for **low cost & small size.** Only 5/8"W x 1-5/8"L x 3/4"H. Easily mounts in many radios.

**Specify tuning range: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, 400-500 MHz.*

LNS-(*) IN-LINE PREAMP

ONLY $89 kit, $119 wired&tested

- GaAs FET Preamp with features similar to LNG series, except **automatically switches out of line during transmit.** Use with base or mobile transceivers up to 25W. Tower mounting brackets incl.

**Tuning range: 120-175, 200-240, or 400-500.*

HELICAL RESONATOR PREAMPS

GaAs FET preamps with helical resonators **reduce intermod & cross-band interference** in critical applications. **MODEL HRG-(*), *$80 vhf, $110 uhf.***

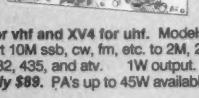
**Specify tuning range: 142-150, 150-162, 162-174, 213-233, 420-470.*

RECEIVING CONVERTERS

Low noise converters to receive vhf and uhf bands on a 10M receiver.

- Input ranges avail: 50-52, 136-138, 144-146, 145-147, 146-148, 220-222, 222-224 MHz, 432-434, 435-437, 435.5-437.5, and 439.25 (to chan 3).
- **Kit less case $49, kit w/case & BNC jacks $74, w&t in case $99.**

TRANSMITTING CONVERTERS



XV2 for vhf and XV4 for uhf. Models to convert 10M ssb, cw, fm, etc. to 2M, 220, 222, 432, 435, and atv. 1W output. ***Kit only $89.*** PA's up to 45W available.

- Buy at low, factory-direct net prices and save!
- For complete info, call or write for free catalog. *(Send $2 for overseas air mail.)*
- Order by mail, fax, or phone (9-12 AM, 1-5 PM eastern time)
- Min. $5 S&H charge for first pound plus add'l weight & insurance.
- Use VISA, Mastercard, check, or UPS C.O.D.

Our 32nd Year!

hamtronics, inc.

65-D Moul Rd; Hilton NY 14468-9535

Phone 716-392-9430 (fax 9420)

QRX . . .

Phase 3-D Project On Schedule

Members of AMSAT's Phase 3-D International Satellite Design Team met in Marburg, Germany, in mid-October for a "top-to-bottom" review of progress on ham radio's most advanced satellite. Dr. Karl Meinzer DJ5KQ and Werner Haas DJ5KQ hosted a series of detailed meetings on all systems and subsystems. During these discussions, team members bench-tested a number of flight hardware electronic items, and set the final operating frequencies for the spacrcraft's transmitters and receivers.

"It was a marathon session," said AMSAT's Dick Jansson WD4FAB upon returning to the US. Team members are now very confident that all key elements of the project are on schedule and that the spacecraft's integration in Florida can continue without interruption.

Phase 3-D is slated for launch in 1996. The sophisticated bird will weigh nearly 900 pounds at launch and, after reaching orbit, will unfurl a solar-panel wingspan of nearly 20 feet.

W2SKE Dead at 78

Bill Leonard W2SKE, a former president of CBS News, died at his Laurel Maryland home on October 23, at age 78. Leonard was an avid DXer and contester in the '60s and '70s and became a well-known spokesman for amateur radio. As President of CBS News, Leonard was credited with the selection of Dan Rather as Evening News anchor, as a member of the team that developed 60 Minutes, and for development of techniques

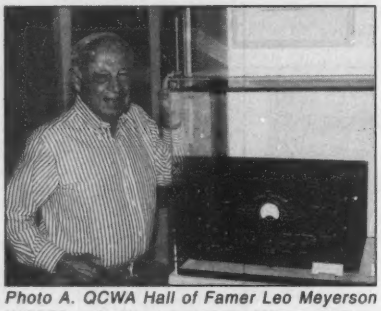


Photo A. QCWA Hall of Famer Leo Meyerson WØGFQ at the Western Heritage Museum in Omaha, NB. (Photo by Jim Musgrove K5BZH.)

which help to predict the outcomes of elections.

During a 1981 interview, Leonard predicted that computers would become more a part of ham radio. He added, "My bet is that ham radio, in one form or another, will be around 100 years from now." *TNX Mohawk Amateur Radio Club, Inc. M.A.R.C. News, November, 1994; ARRL.*

Broadcast FAX

According to Electronic Engineering Times, NBC has formed a data network to broadcast information over the air in the VBI (vertical blanking interval) portion of the network's television-broadcast signal. The first commercial offering will be a facsimile service in cooperation with a London-based firm.

The encrypted addressable FAX will send to specially-equipped computers and FAX machines. One purpose will be to send company information to employees who work at their own homes. Similar technology has been used for years to deliver closed captioning data in the VBI. *TNX Electronic Engineering Times, November 14, 1994.*

WØGFQ in QCWA Hall of Fame

Leo Intone Meyerson WØGFQ was inducted into the Quarter Century Wireless Association's Hall of Fame at the 1994 National Convention. Meyerson has been an avid operator and promoter of ham radio since he received his first license in 1928.

Meyerson founded several amateur radio related companies, including Wholesale Radio Laboratories in 1935, and Galaxy Electronics in 1962. Active in public service, Meyerson has also been a key figure in disaster relief efforts. *TNX Jim Musgrove K5BZH.*

New Paging Licenses

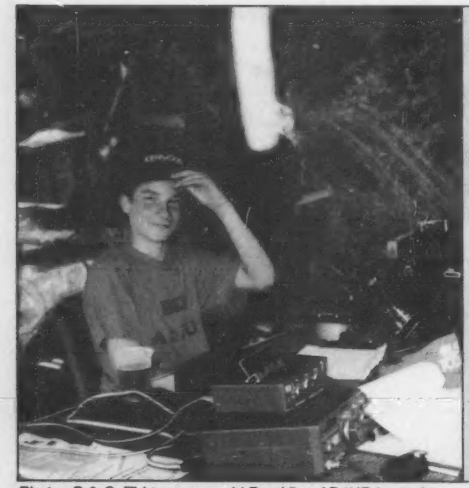
According to an article in Electronic Engineering Times, The Federal Communications Commission's auction of 30 regional licenses for advanced paging services has been completed, with bids totaling some $489 million. The government expects to net $394 million.

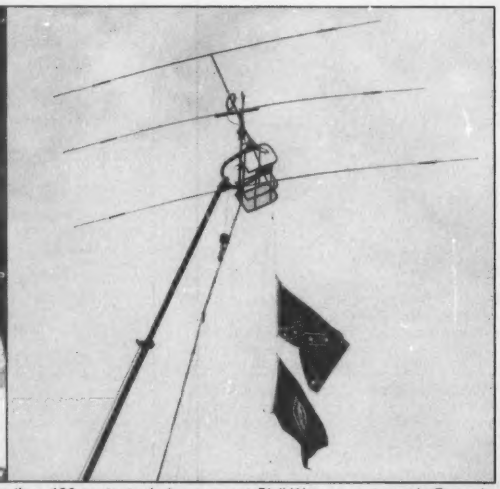
Six licenses were issues in each of five regions from the narrowband wireless auctions. Each region will soon have two licensees ready to deliver two-way voice-quality communications and four others equipped for two-way paging. *TNX Electronic Engineering Times, November 14, 1994.*

FCC To Expand AM Band

The Federal Communications Commission is in the process of expanding the AM broadcast band to incorporate spectrum between 1605 and 1705 KHz. The commission has determined that by expanding the AM band, interference would be reduced and overall quality would improve in the existing 535 to 1605 KHz band.

Eighty AM stations have been identified as being qualified to apply to migrate to one of the 10 new frequencies. Travelers' information stations broadcasting traffic and road conditions at 1610 KHz would remain protected. *TNX W5YI Report, November 1, 1994.*





Photos B & C. Thirteen-year-old Ben Vlug AD4UR logged more than 100 contacts during a recent Civil War reenactment in Roanoke County, Virginia. The Extra Class ham is a member of the Roanoke Valley Amateur Radio Club, sponsor of this special events station. A 24-thousand-pound Kinsey sign crane lumbered into Green Hill Park to set-up this tribander beam some 75 feet in the air. The Battle of Hunter's Raid was revisited, while 43 states and more than 500 contacts were made. TNX Mark Green KE4FPL.

Burghardt INC.
AMATEUR CENTER

182 North Maple
P.O. Box 73
Watertown, SD
57201

Proud to be "AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER"
Serving Amateur Radio Operators Since 1937

Write or call for our latest "Used List" and flyer. We want to be Your Kenwood "Servicing" Dealer!!

SALES ORDER DESK
1-800-927 (4261)
SERVICE (605) 886-7314
FAX (605) 886-3444
FAX Product Info
(605) 886 6914

HOURS: MON. - FRI. 9-5 p.m.;
SAT. 9-1 p.m.
CLOSED SUNDAYS/HOLIDAYS

DEAR HAM FRIENDS,

With the WINTER season sneaking quickly upon us, the time is right to purchase that new HF TRANSCEIVER. Kenwood OFFERS some TOP-OF-THE-LINE products to enhance your operating skills and make your DX-ing and/or Ragchewing more enjoyable during those cool/cold winter months ahead. Call or Write us for a quote on trading your equipment because "SERVING YOU IS OUR BUSINESS AND MOST OF ALL "OUR PLEASURE"!! 73 TO ALL!!

VISA MasterCard DISCOVER

We also honor George Washington, Ben Franklin and Tom Jefferson.

KENWOOD

Happy New Year!

Kenwood New Year's HF Lineup!!!

TS-950SDX

TS-850S/AT

TS-450S/AT

TS-50S

CALL 1-800-927-4261

CALL 1-800-927-4261

73 Review

Number 4 on your Feedback card

by Arnie Johnson N1BAC

The Yaesu FT-840 HF Transceiver

Enjoy a simple-to-operate full-featured HF rig.

Yaesu U.S.A.
17210 Edwards Rd.
Cerritos CA 90701
Telephone: (310) 404-2700
Price Class: $1,099

As we all probably know by now, there are hams who want all the push-buttons, lights, and knobs they can get, and there are those who are intimidated by all those controls and lights. For those of you who are among the intimidated, I've found a great rig for you. I had a chance to play with a radio that is very straightforward and easy to use, and offers nine bands and a general coverage receiver: the Yaesu FT-840 HF transceiver.

Now, don't get me wrong—just because a radio doesn't have a bunch of buttons to insert the frequency and bands doesn't mean that it isn't capable of frequency memorization and interfacing with a computer. This radio performs a lot of great functions.

The package as it came to me consisted of three boxes; the FT-840 HF transceiver, the optional FP-800 power supply/speaker, and the FC-10 automatic antenna tuner. All were well-packaged, and the contents were well-protected. Hooking everything up was very straightforward.

The Front Panel

I was very happy to see that the FT-840 is a somewhat small radio, approximately 4" (H) x 9-1/4" (W) x 12" (D), counting connectors, and very easy to put in your car without asking your wife or friends to sit in the back seat while you put the radio in the front. The front of the radio is not very imposing, just straightforward: 28 well-labeled buttons, seven knobs, frequency/mode read-out, an S/PO/ALC meter, mike connector and 'phones jack. The first group of buttons on the left side of the panel control power, meter choice (PO or ALC), MOX (manual transmitter activation), attenuation, mike processor, AGC, noise blanker, SSB, CW, AM, FM, and frequency lock. Others on the right side control functions of the A & B VFOs and memories, split, tuning speed, choice of ham/general receive, and changing of bands. The last button group manages the automatic antenna tuner (if used), memory choice, scanning, and clarifier on/off.

Centered under the large, well-lit and easy-to-read frequency/mode read-out is the main tuning knob which has a very nice touch of movement. Knobs on the left are inner/outer knobs for microphone input level for SSB & AM transmission and RF power output in all modes. The other inner/outer knob set is AF, which adjusts the volume of the receiver, and Squelch, which sets the signal threshold at which the receiver audio is muted in all modes. The last two knobs, on the right, control the Clarifier offset frequency up to +/- 1.25 kHz, or optional 2.5 kHz, and the IF passband center frequency from the displayed frequency in modes other than AM and FM.

All the controls are well-labeled and easy to see. The large read-out shows the receive/transmit frequency, modes, memory channel used and whether you have tuned off that frequency, antenna tuner operation and high SWR, clarifier use, scanning selected, FM +/- offset and CTCSS tone use, frequency lock in use, fast tuning, VFO choice, general coverage receiver in use, split frequency selected, squelch open, and transmitter in operation.

The Back Panel

But there's more to a radio than just the front panel. The radio can't do much for you unless the signal can make it out to the antenna. Turning the radio around to hook up the antenna provides a view of the some of the rest of the controls/connections that continue to make this radio what it is.

There are only three set-and-forget controls on the back: speech processor compression, CW semi-break-in timing control, and CW sidetone level. Also on the back are connectors for antenna coax, the power connector, 200mA/13.5 VDC output, CW keyer, constant-level receiver audio output for use with a packet TNC or other terminal unit, external ALC, external Push-To-Talk, external speaker, a 6-pin mini DIN input/output jack for external computer control, a 5-pin mini DIN jack for the FC-800 external automatic antenna tuner, a 8-pin mini DIN jack for the FC-10 external automatic antenna tuner, and an 8-pin jack to output control signals for the FL-7000 linear or FC-1000 ATU.

One more feature that needs to be mentioned is the grill on the back, which hides the internal thermally-switched fan that allows full transmitter output without any rear panel protrusions.

Hookup

Hookup is very straightforward. The MH-1 B8 hand-held microphone, providing up/down frequency changes and speed of changes, connects easily to the front panel. The frequency change buttons on the mike can also be used to start and stop receiver scanning. The radio comes with a double-fused DC cable and plug to hook to your own 13.5-V DC power supply or automobile electrical system, but I used the provided FP-800 power supply/speaker.

Lastly, I hooked up the FC-10 Full Automatic Antenna Tuner. Again very easy: Hook your antenna coax to the ANT connector, the coax jumper between the TRANSMITTER

MFJ-1278B *with* DSP
multi-mode data controller

Only MFJ gives you DSP and 10 digital modes -- Packet, PACTOR, AMTOR, RTTY, Color SSTV, 16 Gray Level FAX/ Weather FAX, ASCII, Navtex, CW, and Memory Keyer . . . for only $379.95

Now with DSP!

MFJ-1278B/DSP with DSP
$379.95

MFJ-1278B less DSP
$299.95

Combining "brick wall" DSP filters with the *world class* MFJ-1278B gives you ham radio's most powerful multi-mode data controller -- the *new* MFJ-1278B/DSP -- for an incredibly low $379.95.

You won't believe your eyes when you see *solid* copy from signals completely buried in QRM!

This MFJ-1278B/DSP, your transceiver and computer are all you need for exciting digital QSOs!

You'll discover a whole new world of ham radio. You'll communicate in ways you never knew existed.

The MFJ-1278B/DSP and MFJ-1289 *MultiCom*™ software are packed with features available only from MFJ.

You get 10 digital modes . . . Packet, PACTOR, AMTOR, RTTY, color SSTV, 16 Gray Level FAX/Weather FAX, CW, ASCII, Navtex and Memory Keyer . . . plus an enhanced 32K mailbox that's expandable to 512K.

You'll have fun joining worldwide packet networks and exchanging color SSTV pictures with your buddies.

You'll marvel at *full color* FAX news photos as they come to life on your screen, and you'll see weather changes on highly detailed weather maps in all 16 gray levels.

You'll eavesdrop on late breaking news as it happens on RTTY.

You'll enjoy error-free HF QSOs on PACTOR and AMTOR and enjoy receiving packet mail in your mailbox.

Wanna copy some CW? Just relax and read your screen.

MFJ-1278B, $299.95, no DSP.
MFJ-1278BT, $369.95, built-in 2400 baud modem, no DSP.

MFJ-780, $99.95,"brick wall" DSP data filter. Plugs into MFJ-1278B only.

MFJ-1289, $59.95, *MultiCom*™ PC software brings out the full power of MFJ-1278B series. Includes PC cable.

Only MFJ gives you all these features . . .

***Exclusive* MFJ-1278B Features**

- •Sharp "brick wall" DSP filters(MFJ-1278/DSP)
- •Color SSTV, transmits and receives . . .
  - -Robot Color: 36, 72 seconds
  - -Robot B/W: 8, 12, 24, 36 seconds
  - -Scotty Color: 1 and 2
  - -Martin Color: 1 and 2
- •16 Gray Levels FAX/SSTV Modem . . .
  - -receive all 16 gray levels of weather FAX, color AP wire photos, color SSTV
- •Real-time Packet pictures . . .
  - -SVGA, VGA, EGA, CGA high resolution full color packet pictures
- •Exclusive MFJ **hardware** features . . .
  - -20 LED precision tuning indicator
  - -Built-in parallel printer port
  - -Individual radio port output level controls
  - -TAPR internal modem header for high speed modem -- 2400 or 9600 baud
  - -Monitor amplifier, volume control, speaker jack for monitoring receive/transmit data
  - -10 user programmable message memories
  - -CW iambic paddle input
  - -IC sockets used throughout
  - -*Free* 110 VAC power supply
- •Exclusive MFJ **software** features . . .
  - -*Automatic Digipeater*™ routing
  - -Built-in packet connect bell
  - -*Call Alert Beeper*™
  - -*AutoMonitor alarm*™ detects incoming character strings
  - -Simultaneous QSOing and file transfering
  - -*Automatic Signal Analysis*™ for packet, AMTOR, RTTY, ASCII
  - -Stored parameters for each mode
  - -Dedicated MARS mode

***New* Features**

- •PACTOR mode with mailbox
- •32K Packet mailbox expandable to 512K -- allows separate callsign, auto mail forwarding and reverse mail forwarding, Remote Sysop access, Sysop paging, chat mode, mailbox C-text
- •*Mail-Waiting*™ LED indicator
- •64K battery backed up RAM
- •1 Megabit system EPROM
- •External accessible reset
- •Up to 19.2K baud terminal operation
- •Color SSTV with VIS tones for picture autostart
- •Selectable European RTTY tones
- •Optional plug-in *crosspattern* scope tuning adapter

***Standard* MFJ Features**

- •Standard MFJ **hardware** features . . .
  - -Built-in 300 and 1200 baud packet modem
  - -Two software selectable radio ports
  - -Noise threshold control improves HF operation
  - -True DCD for excellent HF operation
  - -RS-232 and TTL serial ports
  - -*Fast-Start*™ Manual
- •Standard MFJ **software** features . . .
  - -*Anti-Collision*™ gets packets through faster
  - -Auto terminal baud rate: 300, 1200, 2400, 9.6K, 19.2K
  - -KISS interface for TCP/IP, NetRom, MSYS
  - -Host mode
  - -Normal or reverse FSK output

MFJ *No Matter What* Guarantee™

- •One year *unconditional* guarantee . . .
  - -MFJ will repair or replace your MFJ-1278B (at our option) *no matter what* for a full year

MFJ VHF/HF Packet TNCs

MFJ-1270C
$119.95

Enjoy Packet on VHF *and* HF at 1200 /300 baud with the *world famous* MFJ-1270C. Operate 2400 or 9600 baud with optional plug-in modems .

The MFJ-1270C is widely acclaimed as *the most reliable packet TNC in the world* -- many work 24 hours a day for years without failure!

Fully TAPR TNC-2 compatible, *free* 110 VAC power supply, mailbox expandable to 512K, WeFAX mode prints weather maps, KISS interface, Host mode, RAM/ROM each expandable to 512K, up to 19.2K terminal baud rate, monitor amplifier, external reset, *enhanced* DCD for HF.

MFJ-1276 $159.95, MFJ-1270C with PACTOR, precision tuning indicator, extra 32K mailbox memory.

MFJ-1270CT, $209.95, MFJ-1270C with 2400 baud modem.

MFJ-1270CQ, $229.95, MFJ-1270C w/ 9600 baud G3RUH modem.

Free MFJ Catalog
Write or call toll-free . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
24 Hour FAX: (601) 323-6551
Technical Help: 800-647-TECH (8324)

MFJ ENTERPRISES, INC.
P.O. Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST Mon.-Fri.
7206.1763@compuserve.com

MFJ . . . making quality affordable

Prices and specifications subject to change without notice ©1994 MFJ Enterprises, Inc.

connector and the radio connector, and the controller cable from the CONTROL connector to the 8-pin DIN jack labeled TUNER 2 (for the FC-10 tuner) on the back of the radio. Don't force the connectors—make sure that the pins line up before inserting and that you are inserting the 8-pin male connector into the 8-pin female receptacle, not the 5-pin labeled TUNER 1 (for the FC-800 tuner).

General Description

Yaesu developed the FT-840 to be a high-performance transceiver that provides up to 100 watts transmitter output power on all HF amateur radio bands in CW, SSB, and FM modes, and up to 25 watts carrier in AM. The receiver tunes all frequencies between 100 kHz and 30 MHz in 10-Hz steps.

Modular circuit design employs surface-mount components on composite epoxy boards for high reliability and serviceability. Twin direct-digital synthesizers and a magnetic rotary encoder provide silent, silky-smooth tuning. Frequency accuracy and stability are assured by driving both synthesizers from a single master oscillator, and the optional TCXO-4 temperature-compensated crystal oscillator is available for enhanced +/- 2ppm stability from 0-50° C.

The FT-840 features a low-noise, high-performance receiver front end. Interference rejection is facilitated by the unique "up-down" conversion scheme, and includes an IF shift circuit. The optional YF-112C crystal filter can be installed to provide enhanced CW reception, and an AM-wide filter is also available for greater fidelity during broadcast reception.

A 16-bit microprocessor in the FT-840 is programmed to provide the simplest possible control interface for the operator. Two independent (A/B) VFOs for each band (20 total) hold their own frequencies and mode settings. One-hundred memories store all of this data for both VFOs, giving a total of 220 independent sets of frequency, mode, and other selections. Flexible scanning features allow all 100 memories, or only those selected to be freely-tuned and scanned. Group scanning allows you to organize your memories into 10 groups, and only scan channels within a selected group. In addition, 10 special memories also let you limit the tuning/scanning range between their stored frequencies. Scan resume is selectable between timed or carrier-delay, and scanning speed is also adjustable.

Operation

Well, as it is said, "the proof is in the pudding." How does it play? The tutorial suggests that you check the following switches and knob positions before any hookups: POWER & MOX switches off; MIC, RF PWR, SQL all ccw (minimum); AF 10 o'clock; CLAR off; SHIFT 12 o'clock. After hooking it all up, it is very easy to operate. When using a power supply, Yaesu suggests turning the power supply on first, then the transceiver, to avoid having voltage spikes damage the radio.

Power switch ON, display lights on, no smoke! That always makes me feel good. Normal hiss from the speaker. I started tuning around; nice feel to the tuning knob. Good signals coming from the speaker; nice audio quality.

Specifications

General
Receiving frequency range: 100 kHz-30 MHz
Transmitting frequency ranges: 160-10 meter amateur bands
Frequency stability: +/-10 ppm (or +/- 500 Hz FM), from 0-4°C and +/-2ppm (or +/- 300 Hz FM), from 0-50°C (w/TCXO-4 option)
Emission modes: USB, LSB (J3E), CW (A1A), AM (A3E), FM (F3E)
Frequency tuning steps: 10 Hz/100 Hz (CW, SSB); 100 Hz/1 kHz (AM,FM)
Antenna impedance: 50 ohm nominal
Operating temp. range: -10 - +50°C
Supply voltage: 13.5 VDC +/- 10% negative ground
Power consumption (approx.): 1.2A rx (no signal); 20A tx (100 watts)
Dimensions (WHD): 238 x 93 x 243mm
Weight (approx.): 4.5 kg

Transmitter
Power output: Adjustable up to 100 watts (25 watts AM carrier)
Modulation types: SSB—balanced, filtered carrier; AM—low-level (early stage); FM—variable reactance
Maximum FM deviation: +/- 2.5 kHz
Harmonic radiation: Greater than 50 dB below peak output; 45 dB (10, 18 MHz)
Spurious radiation: Greater than 40 dB below peak output
SSB carrier suppression: Greater than 40 dB below peak output
Undesired sideband suppression: At least 50 dB below peak output at 1.5 kHz modulation
Audio response (SSB): Not more than -6 dB from 400-2600 Hz
3rd-order IMD: -25 dB @ 100 watts PEP, 14.2 MHz
Microphone impedance: 500-600 ohms

Receiver
Circuit type: Dual-conversion superheterodyne
Intermediate frequencies: 1st—47.055 MHz; 2nd—8.215 MHz; 3rd—455 kHz (FM)

Sensitivity:

Freq/Mode	150-250 kHz	250-500 kHz	0.5-1.8 MHz	1.8-30 MHz
SSB,CW (2.4 kHz)	Less than 5 µV	Less than 2 µV	Less than 1 µV	Less than 0.25 µV
AM (6kHz)	Less than 40 µV	Less than 16 µV	Less than 8 µV	Less than 1 µV
FM (28MHz-30MHz)(8kHz)	——	——	——	Less than 0.5 µV

Selectivity:

Modes	Min 6dB BW	Max 60dB BW
CW narrow (optional)	500 Hz	1.8 kHz
SSB, CW, AM narrow	2.2 kHz	5.0 kHz
AM-wide (optional)	6 kHz	14 kHz (-50 dB)
FM (optional)	8 kHz	19 kHz

Squelch sensitivity 1.8-30 MHz (CW, SSB, AM)L Less than 2.0 µV 28-30 MHz (FM) Less than 0.32 µV
IF rejection (1.8-30 MHz) 60 dB or better
Image rejection (1.8-30 MHz) 70 dB or better
IF shift range +/- 1.2 kHz
Clarifier tuning range/steps +/- 1.25 kHz/20 Hz; +/- 2.50 kHz/10 Hz
Maximum audio power output At least 1.5 watts into 4 ohms with less than 10% THD
Audio output impedance 4-8 ohms

One of the first things I decided to do was see how the automatic antenna tuner would work. I selected TUNER and the TUNER logo came on the display panel. Now what? I keyed the mike and saw TX and WAIT (under the TUNER logo). I correctly assumed that this meant that I shouldn't do anything until the tuner did its thing. I assumed that to tune I should hit the button marked START. I glanced at the Operating Manual just to make sure. Yep! I then watched the Power Out indicator fluctuate up and down as the tuner worked and the transmitter dropped out, showing completion. I later inserted a two-needle SWR meter between the transceiver and tuner to watch the show. Quite interesting. After using the tuner once on a band, it recalls previous settings from memory (the tuner has 31 of its own) during reception, whenever you tune to the same part of the band again. It's fun to watch the WAIT light flash on as you tune through a band (only with TUNER selected). It even does a great job on 160 meters which some other manufacturers' tuners do not. I did find that the tuner didn't reach proper tune on some frequencies using my 160 meter dipole, but could reach the tune if I worked my way up or down to the frequency, starting at a point where it would tune. No big deal, just some extra time involved.

I then tuned around and responded to several CQs. The reports of transmitter audio quality were quite good; processor audio just increased the "punch" a bit. While playing with the hand-microphone, I noticed a switch on the back labeled TONE - 1 or 2. Changing the selection changed the tonal quality of my voice. Setting 2 suppressed the low frequencies in my voice. I left it in a position (1) that reports said was best for my voice. I also played with the DWN and UP scan buttons on the mike, and checked how FST affected the scan rate.

Next chore, make some memories. Is it easy or do I have to read the manual? Select an unused memory channel with the MEM DOWN/UP buttons, select your frequency, press the VFO>M button for 1/2 second (hear 2 beeps), and it's done! Is that easy or what?

I must also say something about the well-written Operating Manual. From what I can see, it has left nothing out and is not too technical. One thing that I really liked was at the start of the Operation Section. It began with a tutorial: step-by-step samples of what you can do to get started and become familiar with the equipment.

The rest of the time operating with the FT-840 was spent playing with all the knobs and buttons. No surprises! It made many contacts during its time with me and never caused any problems. I'm going to hate giving this one back! A rig like this could keep me happy for many years to come.

If you are looking for a small, quality, well-featured, all-band HF transceiver that is easy to operate, the Yaesu FT-840 HF transceiver could be a good choice for you.

Optional Accessories

- Two external automatic antenna tuners: the FC-10, styled to match the size and appearance of the FT-840 in the shack; and the FC-800, which can be mounted outside at the antenna feedpoint or in the trunk of your car;
- The FP-800 AC power supply with loudspeaker;
- The SP-6 external loudspeaker with audio filters and the optional LL-5 phone patch;
- The MMB-20 mobile mounting bracket;
- The YH-77ST headset;
- The FM unit—747 narrowband FM reception and transmission;
- The FIF-232 CAT system interface to convert the TTL levels required by the transceiver to the RS-232C levels required by the serial port of a computer;
- The MD-1C8 desktop and MH-1B8 hand microphone;
- IF crystal filters for CW and improved AM reception.

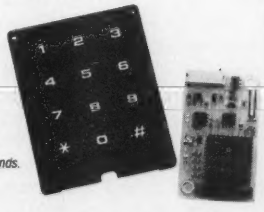
ID-8 Automatic Morse Station Identifier

Compatible with Commercial, Public Safety, and Amateur Radio applications. Uses include Repeater Identifiers, Base Station Identifiers, Beacons, CW Memory Keyers, etc. Great for F.C.C. ID Compliance.

- Miniature in size, 1.85"x1.12"x0.35".
- Totally RF immune.
- All connections made with microminiature plug and socket with color coded wires attached.
- CMOS microprocessor for low voltage, low current operation: 6 to 20 VDC unregulated at 6ma.
- Low distortion, low impedance, adjustable sinewave output: 0 to 4 volts peak to peak.
- Crystal controlled for high accuracy.
- Transmitter PTT output (to key transmitter while ID is being sent), is an open collector transistor that will handle 80 VDC at 300ma.
- Field programmable with SUPPLIED keyboard.
- Confirmation tone to indicate accepted parameter, plus tones to indicate programming error.
- All programming is stored in a non-volatile EEPROM which may be altered at any time.
- Message length over 200 characters long.
- Trigger ID with active high or low.
- Inhibit ID with active high or low. Will hold off ID until channel is clear of traffic.
- Generates repeater courtesy tone at end of user transmission if enabled.
- Double sided tape and mounting hardware supplied for quick mounting.
- Operating temperature range, −30 degrees C to +65 degrees C.
- Full one year warranty when returned to the factory for repair.
- Immediate one day delivery.

Programmable Features

- *Eight programmable, selectable, messages.*
- *CW speed from 1 to 99 WPM.*
- *ID interval timer from 1-99 minutes.*
- *ID hold off timer from 0-99 seconds.*
- *CW tone frequency from 100 hz to 3000 hz.*
- *Front porch delay interval from 0 to 9.9 seconds.*
- *CW or MCW operation.*



$89.95 each
programming keyboard included

COMMUNICATIONS SPECIALISTS, INC.
426 WEST TAFT AVENUE • ORANGE, CA 92665-4296
(714) 998-3021 • FAX (714) 974-3420
Entire U.S.A. (800) 854-0547 • FAX (800) 424-3420

CIRCLE 10 ON READER SERVICE CARD

PERFORMANCE AND VALUE WITHOUT COMPROMISE

KRP-5000 REPEATER

2 METERS-220-440

Word is spreading fast-
"Nothing matches the KRP-5000 for total performance and value. Not [illegible]"

RF performance really counts in tough repeater environments, so the KRP-5000 receiver gives you 7 helical resonators, 12-poles of IF filtering, and a precise Schmitt trigger squelch with automatic threshold switching. The transmitter gives you clean TMOS FET power.

Enjoy high performance operation with remote programmable sequential tone paging, autopatch, reverse autopatch, 20 number autodial, remote squelch setting, status inputs, control outputs, and field programmable Morse messages.

Call or write for the full performance story . . . and the super value price!

Micro Control Specialties
[illegible] Park, Stoneham, MA 02[illegible]
(508) 3[illegible]-3443

KRP-5000 Repeater shown with PA-100 Amplifier

The first choice in
Transmitters - Receivers
Repeaters
Repeater Controllers
Power Amplifiers
Voice Mail Systems

CIRCLE 144 ON READER SERVICE CARD

The Pyramid Antenna

Harness the power of this 10 meter workhorse.

by Dave Brown W9CGI

Do you believe in "pyramid power"? I do. But not the kind where you have to sit under a pyramid, or put things under it. In fact, I would not even recommend that in this case, as the effects of RFI on the human brain are just beginning to be understood. It is best and safest, therefore, to *not* sit under or to close to *any* antenna. The pyramid I am about to tell you about grew out of my continuing experiments with all types of antennas.

I became a ham originally because I found antennas, and that invisible link or transfer of power from a physical object to thin air, absolutely fascinating. I think you will find this antenna, the "Pyramid," interesting in construction and concept, easy to build, and quite rugged. That last part always has been interesting to me, as when I do build a winner from a performance basis I hate to be repairing it all the time—instead of *using* it on the air! This one, like a bridge, has inherent structural ruggedness.

Why a Pyramid?

That's a fair question, considering I have never seen anything that looks quite like my antenna. The design sort of evolved from trying to get an idea from paper to the sky. That is true of many antennas I have used over the years, and I'll own up to the fact I am not an antenna engineer by trade. I get antennas that work, and work well thank you very much, quite like Edison got inventions. I derive concepts from others' ideas and articles to be sure, and often times an antenna like this one truly is revolution by evolution. I started off by wanting to try the extended ideas of the bi-square, or extended dipole. This is nothing more than a regular dipole with an extra 1/2 wavelength added to the driven side of it. I learned years ago when I first used it that PVC tubing is the way to go whenever possible to do the "plumbing" (forgive the pun) on any of my antenna projects. It is strong, easy to cut, and many of the joiners you require for a particular configuration already exist as the 45 degree ELL, the 90 degree elbow, and of course the TEE. The mechanical construction of the Pyramid is nothing more than the proper collection of these with the correct lengths of 1/2" PVC tubing. A word of warning to those of you who do not do any amateur home plumbing or repairs: All plumbing items and pipe refer to flow, and therefore to *inside* diameters. Electrical conduit, on the other hand, is measured by *outside* diameter. This can be a great convenience when intermixing the two for antenna projects, but can be quite confusing to someone trying all this for the first time. The 1/2" tubing used to build the Pyramid is actually nearer to 7/8" *outside* diameter.

When you are trying to visualize my antenna, I'm sure that it might help you see something just a bit bigger, and stronger, than the 1/2" implies. To further explain why this Pyramid, like all Pyramids, is a joining of several triangles along their sides: It has long been known in the structural trades that the triangle is the *strongest* natural shape known to man. Thus, when you unite several of them, as in the side rails of older bridges you still see, you end up with a very strong truss or support.

There was one caveat I learned after the first attempt to build a 10 meter version of the Pyramid: The heat of summer *does* cause PVC, a plastic, to sag somewhat. Not wanting to find out the hard way how far the sag would go before breakage would result, I built the first version of the 10 meter Pyramid with a few more webs for the spiders to walk on and the birds to try to avoid. On the backside, as you will see, this also led to a very convenient place to run a nice centered feed down to the reflector element and keep the electrical construction well balanced side-to-side. The use of tubing at the corners nicely takes care of a place to run the feed for the driven element as well. Consider if I had merely run the feed down the center tubing at the front, and done the reflector "feed" down the center back to a normal reflector element—voilà—a standard 2 element yagi beam. Admittedly it would look different, but that is all it would be.

Bend Here—Tuck There

Bending the driven element as I did into the Pyramid was for two reasons. The first was the simple fact that if you do not do so, even on 10 meters, you would wind up with the bi-square about 33 feet long. That puts you out of the VHF "plumbing" league, and right back to unwieldy and usually unsteerable wire antennas. My Pyramid had to "steer" like a yagi, but beat it in performance. After all, it was my newfound and totally accidental love for QRP on 10 meters that led to the Pyramid in the first place. "Folding in" the ends of the bi-square allows the width to become about 16-1/2 feet, and back to what I consider manageable yagi-type antenna sizes. The electrical reason to bend the ends in did not come to mind until I began a rather vigorous evaluation of the antenna against my usual 10 meter antenna (a three-element home-brew yagi), and a reference dipole also made up into PVC for strength and weathering. Just as any other time you bend/fold an antenna element, both the feed impedance and the pattern of radiation are going to change. When you start bending things around in an intentional manner as I did, you can only hope the other changes are going to be ones that are favorable. I'm happy to report these certainly were very favorable. Bending cut the apparent beamwidth by about half as compared to the bi-square out straight, and to about a third as compared to my dipole! Now that does *not* make it like the razor-sharp VHF/UHF antennas I have built, but it sure puts a lot of gain in the direction you want it to go. It makes an ideal contest antenna for me, as the apparent beamwidth of about 20 to 25 degrees at the major lobe, and no nasty minor lobes, lets me put everything "on-target," and still not be so narrow as to miss half the fun going on. This 5-watt fetish I seem to have caught only since getting the use of 10 meters (I was a 30-year Tech licensee, with absolutely no interest in the other HF nonsense and quibbling), and needing an antenna like the Pyramid to make up mostly for the other guy's killer-watts. On a quiet band devoid of the horsepower hogs, I managed even before the Pyramid to get my WAC in a month, the 1,000 mile-per-watt club in two months (Paraguay, S.A. with 100 mW), and lots more fun. It is much easier now with the new antenna, much like having about six elements up there without all the hassle and mechanics that would require. By the way—it only goes up 16.5 feet in the air for you non-climbing amateurs!

Build It—Hang It—Get It On

See Figure 1. The actual construction is best covered by the pictures and drawings, but I will verbally walk you through it as well. One cardinal rule: PVC pipe is *great*. It will give you a lot of fun, it is inexpensive

The PC-1610 has begun to revolutionize CW & RTTY/ASCII operation on the HF bands. The "Plug-in & Operate" concept is making digital operation a snap, with only a standard IBM* type AT keyboard required for RTTY/ASCII operation. Received data is displayed on the built in LCD display or an external RS-232 serial device such as a "Dumb Terminal." The PC-1610 offers the following features:

- Built-in AT keyboard interface (keyboard optional)
- 160-10M ham band coverage
- USB/LSB/CW/FSK modes
- 75W output power
- Built in digital power/SWR meter
- DDS VFO with 1Hz step size
- Selectable variable speed/fixed 10Hz step VFO tuning
- Built-in 24hr clock
- 90 tunable memories
- 1 scratchpad memory
- 9 (256 character) keyboard data buffers
- Built-in 5-75 wpm IAMBIC keyer
- Built-in 2.4KHz, 1.8KHz, 500Hz, 200 Hz & RTTY filters
- Notch filter
- Select 1 of 3 antennas from front panel

Specifications are subject to change without notice.
* IBM AT is a registered trademark of the IBM Corporation.

- Basic display lets you know exactly where you are.

```
14.03510-T   0930
14.03510-R   M000
```

- Standard Display shows RX/TX VFO freq's, time and current memory

- Send & Receive in: CW / RTTY(BAUDOT) / ASCII

```
TNX FER QSO, 73
```

← Incoming data

← Outgoing data appears here

- Store up to nine 256 character messages.

```
14.03510-T   0930
3> CANNED    MSG
```

- Messages can be: edited, sent & appended to outgoing message

← Format & Edit stored MSG's here

PC-1610 = HF XCVR + PC + DATA CNTLR +

- The PC-1610 Performs the functions of an HF Transceiver, Computer, Data Controller and Control Software all in one package.

The PC-1610 has too many features to adequately describe in one ad... call or write for a detailed brochure—Major Credit Cards Accepted.

patcomm corporation

Designed and manufactured in the U.S.A.
Phone: (516) 862-6512 ■ Fax: (516) 862-6529
7 Flowerfield, St. James NY 11780

CIRCLE 321 ON READER SERVICE CARD

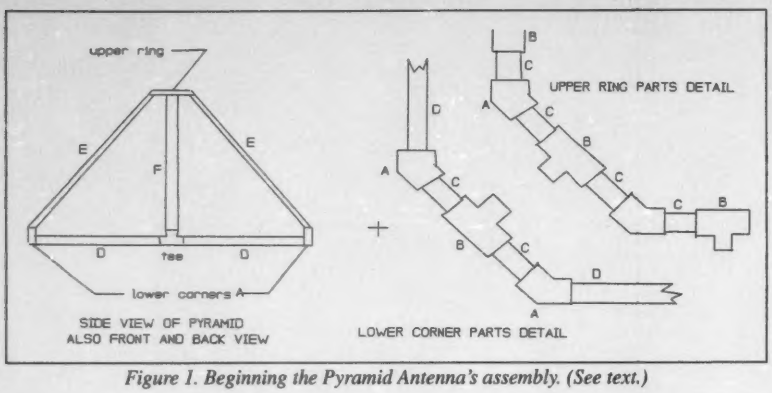


Figure 1. Beginning the Pyramid Antenna's assembly. (See text.)

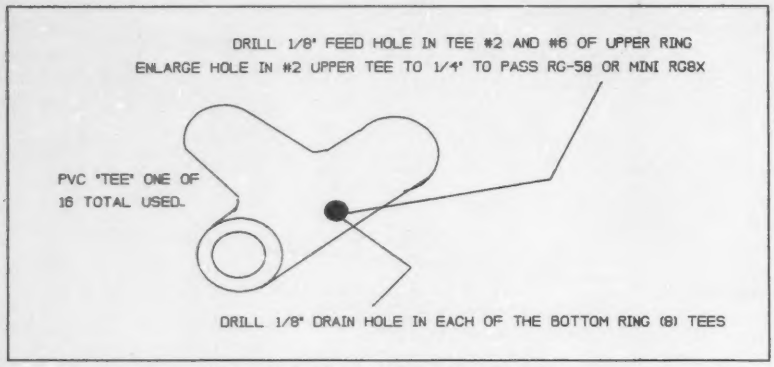

DRILL 1/8" FEED HOLE IN TEE #2 AND #6 OF UPPER RING
ENLARGE HOLE IN #2 UPPER TEE TO 1/4" TO PASS RG-58 OR MINI RG8X
PVC "TEE" ONE OF
16 TOTAL USED.
DRILL 1/8" DRAIN HOLE IN EACH OF THE BOTTOM RING (8) TEES

Figure 2. Drilling the Pyramid's "T" holes.

construction material, and is quite forgiving in all but one way: Whenever you get ready to glue two parts together (cement, to be technical), *make sure you mean to do it!* This stuff puts epoxy to shame. The process you are using actually bonds the two pieces by fusing, so it is not just a glue joint. When you are done, you will have a one-piece antenna. I can't impress that often or strongly enough. The materials and cement are quite safe to use if you follow the directions, and by all means do pre-fit *everything*, no matter how sure you are that your cut and gloop shot will work. Begin by cutting all the parts except the four I will cover later: the shorter uprights at the center of the sides. The easiest parts are the corner uprights, part "E," because all you do is buy them, bring them home in their full 10-foot-long glory, and use them—no cutting required.

Next, you do cut some tubing, and I recommend using a hacksaw or backbow saw with fairly fine teeth. Something you would use on metal tubing or aluminum will work fine. Use of a saber saw in this day of electrical aid and abetting is quite all right, but not necessary. There are not all that many cuts to make. In order to practice your cuts, we'll start on something simple but necessary. Try very hard to keep the cuts 90 degrees, or a cut straight across the tubing. This eases matters a lot when you go to put them into the joiners later. Take one piece of tubing and clamp it firmly, but gently, into a vise or firm clamp. Then proceed to demolish it by practicing your cutting and making 24 pieces that are two inches long. I will admit that absolute accuracy in the length is not required, but in order to end up with a nice symmetrical antenna, neatness *does* count.

Now that you are a real pro at cutting (hey, there *is* a knack to it), we can move on to the only other cutting required. (See, I told you this was also an easy antenna. Just remember the GLUE thing, OK?)

Take eight pieces of PVC tubing and cut the store length of 10 feet down to eight feet long. If you already considered yourself capable of cutting the 2" pieces above, then yes, you could have cut them out of the two-foot pieces that are coming off these 10-foot pieces and saved buying one piece. I just want to be sure you are comfortable working with PVC, and offer the information that you can do it either way. When you are finished, you will have the eight necessary pieces marked "D" in the drawings. Right now I will tell you that no matter how neatly you saw, the edges are going to end up rough, and the hole inside somewhat plugged. Sand all edges smooth and clean out that hole carefully with either a box cutter, an X-acto knife, or the sharp edge of a common screwdriver. Do each one *as you finish cutting it,* or sure enough, you will miss one, and later that becomes critical.

Now you get your first try at playing in the glue pot, but I'll let you get your feet wet slowly. That is a joke, and it pays to keep the cement *off* of you and *on* the pipe, though my skin does not seem to mind small amounts accidentally spilled if it's cleaned off quickly. This is not, I am happy to say, like working with some of the super-glue which, if it hits your skin or you put your fingers together, makes you "welded" for life!

It likes the PVC a lot, but your hands are reasonably safe. Do pay very close attention to the can directions and, of course, keep it away from your eyes and the like. Begin the actual assembly by picking up eight of the 45-degree "L" pieces, part "A," and cementing them to each of the eight pieces you just cut to eight feet long, part "D." If you follow the can directions at this stage you can't go very wrong. Be sure the part is seated well, and follow the 1/4-turn instruction to help that, like screwing a nut onto a bolt. By the time you've done one I'm sure you will be impressed with how fast the cement sets up.

Continued on page 18

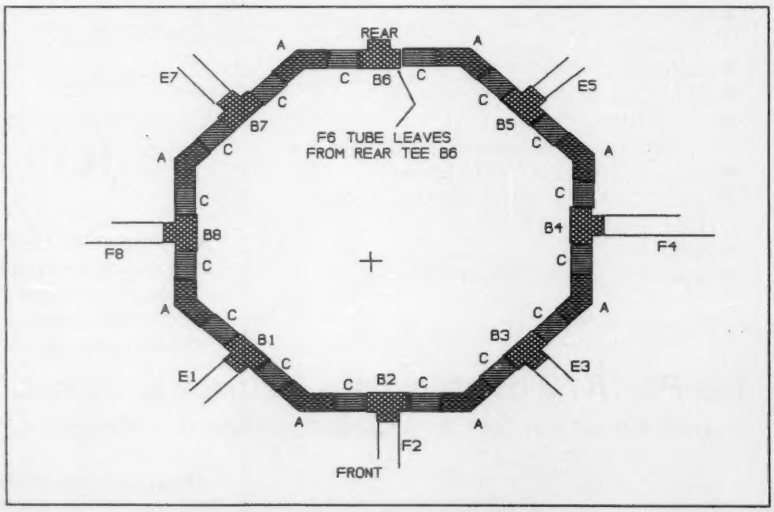


Figure 3. Pyramid's upper ring detail.

Place
Stamp
Here

73 Amateur Radio Today

PO BOX 7693
RIVERTON NJ 08077-8793

☐ YES! I want to grow with *73 Amateur Radio Today!*

Mail this card today!

Send me 1 year (12 issues in all) of 73 for the low price of $19.97! (I save over $15.00 off the cover price.)

For instant service dial toll free 800-289-0388.

Name (please print) Call

Address

City State Zip

☐ Payment enclosed ☐ Bill me

Charge my ☐ MC ☐ VISA ☐ AMEX

Card Number Expires

Newstand rate $35.40. Basic subscription rate $24.97 (Canadian orders add $7.00 per year plus $1.40 GST; other foreign countries add $19.00 per year for surface mail, $42.00 per year for airmail.) Please allow 4-6 weeks for delivery of first issue.

73 Amateur Radio Today

B9501BS80

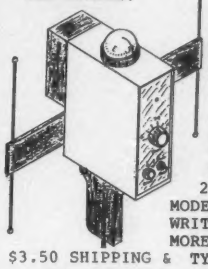
FEEDBACK

In our continuing effort to present the best in amateur radio features and columns, we recognize the need to go directly to the source—you, the reader. Articles and columns are assigned feedback numbers, which appear on each article/column and are also listed here. Please rate each feature or column as "Great," "OK," or "No Way." Mail your responses to: 73 Magazine Feedback, 70 Route 202N, Peterborough, New Hampshire 03458.

1 Never Say Die
2 Letters
3 QRX
4 Review: Yaesu FT-840 HF Transceiver
5 The Pyramid Antenna
6 Using GE Progress Line Receiver Strips
7 PTT Control from Receiver Audio
8 Review: MFJ-1796 Multiband Vertical Antenna
9 An 80/40/30m Tripole
10 Review: Heil Headsets
11 Hamsats
12 RTTY Loop
13 Carr's Corner
14 1994 Index
15 pdates
16 Dealer Directory
17 QRP
18 Hams with Class
19 Homing In
20 ATV
21 Ham Help
22 Above and Beyond
23 Ask Kaboom
24 New Products
25 Propagation
26 Barter 'n' Buy

VECTOR FINDER

ZERO-IN THE SIGNAL!



HAND-HELD PHASE SENSE ANTENNAS FOR VHF DIRECTION FINDING. USES ANY FM XCVR. COMPASS GIVES DIRECTION. ARMS FOLD FOR STORAGE. TYPE VF-142 COVERS BOTH 2-MTRS & 220MHZ. OTHER MODELS AVAILABLE. WRITE OR CALL FOR MORE INFO.

$3.50 SHIPPING & CA. ADD TAX) TYPE VF-142 $139.95 619-565-1319

RADIO ENGINEERS
3941 MT. BRUNDAGE AVE.
SAN DIEGO CA.92111

CIRCLE 58 ON READER SERVICE CARD

Direct Digital Synthesizer Kits

DDS-3: $149 kit, $209 assembled.
- 2 Hz to 12 MHz, 2 Hz steps. Sine and TTL.
- Dip switch or parallel bus controlled.
- 3"x4" PWB. Requires +/-5 VDC.
- 5ppm internal crystal oscillator.

DDS3 PC: $249 kit, $399 assembled.
- 8 bit PC bus version of DDS-3.
- Sine output to +20dBm into 50Ω.
- 0-70 dB step attenuator added.
- Provision for external clock added.
- V-Basic and C software w/sources.

DDS-1C: $89 kit only
- 1 Hz to 524 kHz, in 1 Hz steps, sine only.
- 4"x5" PWB. Requires +/-5 VDC.
- Dip switch controll of discrete DDS.

Call, Write, FAX or e-mail for catalog

Novatech Instruments, Inc.
1530 Eastlake Avenue East, Suite 303
Seattle, WA. 98102
206 328-6902 FAX 206 328-6904
e-mail novatech@eskimo.com

CIRCLE 25 ON READER SERVICE CARD

HamCall CD-ROM
US & International Callsign Lookup
Over 1,000,000 listings and 100 Countries

Includes U.S. Clubs & Military Stations. ICALL program looks up: name, address, expiration date, birth year, license class, county, lat/long, area code, time zone, & elevation. Retrieve by any data element on PC, call, name and zip on the MAC. Hundreds of new programs are on this disc- see the Electronics Software Compendium CD-ROM for a larger collection of software.
•No hard disk required • Print Labels • Export to hard/disk or floppy • TSR runs from text window • Updated every April & Oct • Standing orders accepted • Dealer discounts for 6 or more • Latest public domain PC & MAC software. Same low price of $50.00 plus $5.00 shipping.

New CD-Rom
Electronics Software Compendium

The Electronics Software Compendium is a collection of programs and data files that pertain to electronics, broadcasting, amateur radio and SWL activity. Over 15,000 files in total. The disc is updated and issued semi annually in April & Oct. Over 200 megabytes of material is resident on this CD-ROM, for MAC & PC. Send your order to Buckmaster Publishing, $25.00 plus $5.00 shipping.

BUCKMASTER
Route 4, Box 1630 • Mineral, VA 23117
703:894-5777
800:282-5628
703:894-9141(Fax)
Internet: info@buck.com

CIRCLE 56 ON READER SERVICE CARD

HUGE 100 PAGE CATALOG
- Communications Receivers
- Portable Receivers
- Scanners
- Amateur HF Transceivers
- VHF-UHF Transceivers
- HT's and Mobiles
- Amateur and SWL Antennas
- Accessories and Parts
- RTTY and FAX Equipment
- Books and Manuals

This catalog includes prices!

Send $1 to

Universal Radio
6830 Americana Pkwy. 73
Reynoldsburg, OH 43068
Tel. 614 866-4267

SMART BATTERY CONTROLLERS
FOR LEAD-ACID/GEL-CELLS
BASIC KIT 6 - 20 V.: - $34.95; WITH XFMR.. $ 44.95
WITH ENCLOSURE AND METER- ..... $ 84.95
SOLAR CONTROLLER: 6 - 20 V. ..... $ 44.95

CURTIS KEYER KIT
KR01. INCLUDES AUDIO AMPLIFIER, IAMBIC KEYING, ADJUSTABLE SPEED CONTROL .. $ 39.95
KR02. SPEED METER OPTION ..... $ 10;00

ANTENNAS: TWIN-LEAD LADDER-LINE
MARCONI: 80 M - .... $37.95; 160 M - ..... $ 44.95
J-POLES: PORTABLE OR FIXED STATION (2M, 6M, 220 MHZ) ..... $ 8.95 TO $ 37.95
MULTIBAND "WINDOM" WITH 1:4 BALUN & 50' FEED LINE- ..... $ 89.95
G5RV MULTIBAND ANTENNA (80 THRU 10M). $ 44.95

COMPONENTS
UC3906 BATTERY CHARGER CHIP; 8044ABM CURTIS KEYER CHIP; LM336K; LM350K; NE602AN; MC3423P1; NE604AN; AND MORE
FOR ORDERS CALL 1-800-JADE PRO (523-3776)

JADE PRODUCTS, INC.
PUTTING THE AMATEUR BACK IN RADIO

P.O. Box 368
E. HAMPSTEAD, NH 03826
PHONE: 603-329-8995
FAX: 603-329-4499
$5.00 USA SHIPPING CHARGE

CIRCLE 228 ON READER SERVICE CARD

THIS MONTH'S GOODIE FROM THE CANDY STORE
KENWOOD TH-22AT
Under
$260.00

RDC
KENWOOD TH-315A $340.00
Over 9039 Ham Items in Stock, all Prices, Cash FOB Preston.
More Specials in HAM-ADS.Looking For Something Not Listed??
Call or Write. To save time and money, have the model number ready.
Call Today (208) 852-0830
ROSS DISTRIBUTING COMPANY
78 S. State Street, Preston, Id. 83263
Hours Tue.-Fri. 9-6 - 9-2 Mondays. Closed Sat. & Sun.

CIRCLE 254 ON READER SERVICE CARD

SERIES MODE
Powerline surge protection
- **EFFECTIVE-- required** protection for interconnected or networked equipment
- **RELIABLE**-- non-sacrificial design
- **SAFE**-- Uses no MOVs

Award winning Series Mode technology eliminates the destructive energy of surge voltage **and** surge current!

Call or write for full details today. Ask about your ham operator/ club discount.

ZeroSurge Inc.
944 State Rt 12 Frenchtown NJ 08825
800-996-6696 FAX (908) 996-7773

CIRCLE 268 ON READER SERVICE CARD

SAM Amateur Radio Callsign Database

Find Hams quickly and easily by Callsign or by Name. Search for a specified City, State, or Zip Code. Print with standard or customized output. Ideal for mailing lists, QSL's etc. **NEW FOR '94**, search filters that allow you to specify FIRST NAME, LICENSE CLASS, AGE, ADDRESS, or CALL SUFFIX, AREA, OR PREFIX.

SAM Option files include County Cross Reference, License Expiration Date, Full Date of Birth, Previous Calls and Date First Licensed

Requires IBM Compatible PC, 17.5 MB of hard drive space, and high-density floppy drive.

NOW AVAILABLE ON CD-ROM

Disk Version $39.95 CD-ROM $39.95
SAM OPTIONS $7.50 each
Shipping and Handling $5.00

RT SYSTEMS, INC
8207 STEPHANIE DRIVE, HUNTSVILLE, AL 35802
1-800-723-6922 or 1-205-882-9292
Visa, MasterCard or Discover

The Pyramid Antenna

Continued from page 16

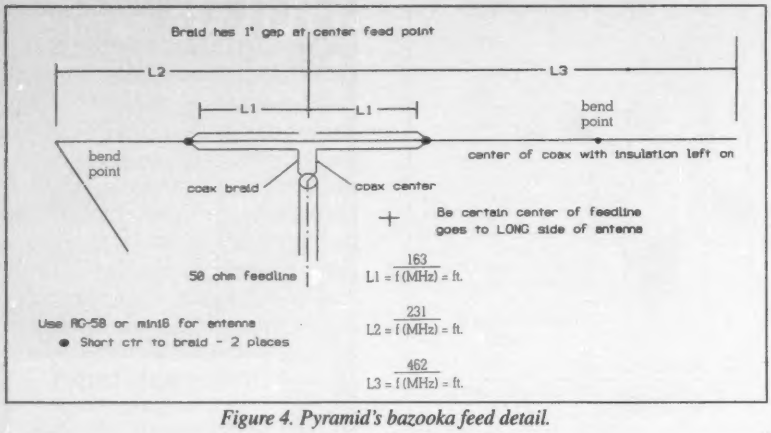

Braid has 1" gap at center feed point
L2
L3
L1
L1
bend point
bend point
center of coax with insulation left on
coax braid
coax center
Be certain center of feedline goes to LONG side of antenna
50 ohm feedline
L1 = 163 / f(MHz) = ft.
Use RG-58 or mini8 for antenna
Short ctr to braid - 2 places
L2 = 231 / f(MHz) = ft.
L3 = 462 / f(MHz) = ft.

Figure 4. Pyramid's bazooka feed detail.

Five-minute epoxy, my foot! This stuff is, for all practical purposes, instant. It is for that reason I want you to follow along with me slowly and work your way up to the final assembly, where things can get really complicated unless you really appreciate the speed at which this cement works. Into the opposite end of each "L," cement a two-inch section of tubing. This will use up eight of your "C" parts, and at this point you should have eight assemblies of C-A-D sequence.

Now that you have become an expert gluer-upper, we can tackle another eight-to-eight assembly that is also non-critical, and is the miniature of what you just did with the eight-foot tubes. Take eight more of the 45-degree "L" pieces and cement them to eight of those two-inch pieces you cut off first.

One more easy step: Take eight more two-inch pieces and cement them into the other end of the 45-degree "L," part "A," just completed. Now, put the lid on the cement and *put it away* for now. That is for your own good, I promise.

Take 10 of the "T" part "B" pieces and drill 1/8" holes in the back of them directly opposite the larger opening (see Figure 2).

Enlarge one hole to just over 1/4" to pass the RG-58 feedline you will add later. This becomes "T" number 1 in the drawing. In the next assembly paragraph, use a second of the drilled "T" parts as number five. All the other "T" parts in the upper ring are undrilled (six, total).

Next, we need to do a little practice assembly, and since the top of this Pyramid is just a mini-version of the bottom, we will begin by assembling the top ring. Note: Assemble—do not cement. Press-fit a "T" onto one end of the eight 45-degree "L" part "A" just done, and then press-fit another into the opposite end of the "T." Continue alternating "T"s and 45s with two straights until you form a complete circle. The whole thing should be just flexible enough to fit the last pieces together without distorting or stressing the overall circle too much.

If you follow the diagram, you will end up with a circle of parts in a B-C-A-C B-C-A-C sequence all the way around, and have eight "T" parts "B," eight "L" parts "A," and 16 straight two-inch pieces, parts "C." Do the assembly on a flat surface and leave the "T" pieces heading straight out from an imaginary point at the center of the circle (for now). Be sure you have the numbered "T" parts (one and five) where they belong in the ring.

Now you can go for broke and assemble the lower ring. It goes very much the same as the upper ring. The exception is that the "L" 45-degree "A" parts now have parts "C" and "D" in each in place of the much smaller upper ring C-A-C combinations, so a bigger ring will result.

The easiest way to assemble the lower ring is to first find an open area in the shape of a square about 20 or more feet on a side. (Two-car garages are great, but I don't have one, either.) Any flat open area will do. By *press-fit only,* assemble the lower ring, following the diagram shown in Figure 3. I found it easiest to put the eight-foot pieces into a "T" and build each side, and then assemble the corners. Any order is all right, just *don't glue things yet.*

Mechanical to Electrical

Do the first cut on your feedline by cutting a piece of RG-58 to exactly 13.0 feet long. This is 1/2 wavelength at 10 meters, in coaxial rather than free-space terms. Continue on to the dipole.

Now is the time to build the "real," or electrical, parts, of the antenna. You can see by Figure 4, and the references to the two other antenna articles listed at the end of this article, that I have at last found a matching device for dipoles that works, is super-easy to do, requires *no* setting, and has *never* ended up with higher than 1.2:1 SWR on any I have made. Re-checking that one even proved that I just plain did not measure accurately. Do it right the first time and you will have no problems, I assure you. Taking just the outer insulation off the dipole center, then splitting the braid, and lastly soldering the feedline to it is admittedly delicate work, but just take your time and follow my sequence of doing it. First look over the diagram carefully and study it until you are sure just what is being done, and are familiar with all the dimensions. Then cut the insulation as shown, move inward and cut and remove the center one-inch of braid and solder the feedline to the feed point. The ground braid side of the feedline solders to the braid on the shorter end of the bi-square. The center conductor solders to the braid on the longer side of the antenna. Follow the diagram closely, as this is the easiest place to reverse something and end up with a dud instead of a winner.

When all that is done, half of the electrical work is done—the hard half. For the reflector element you can use copper wire in #14-#18 gauge, just like light-duty house wire. #10 or #12 is usually used for houses nowadays, but is a bit heavy, and does not work a bit better—I tried it! If the wire has a coating or insulation you will have to remove an inch or so at the reflector feed point in order to solder the reflector feed wire to it. Another good wire material is TV twinlead. Run from the hub at the center of the upper hub down the back center tube "F" part. Then solder another piece of twinlead as shown that is one wavelength in length on either side. That is fed out the back tubes of

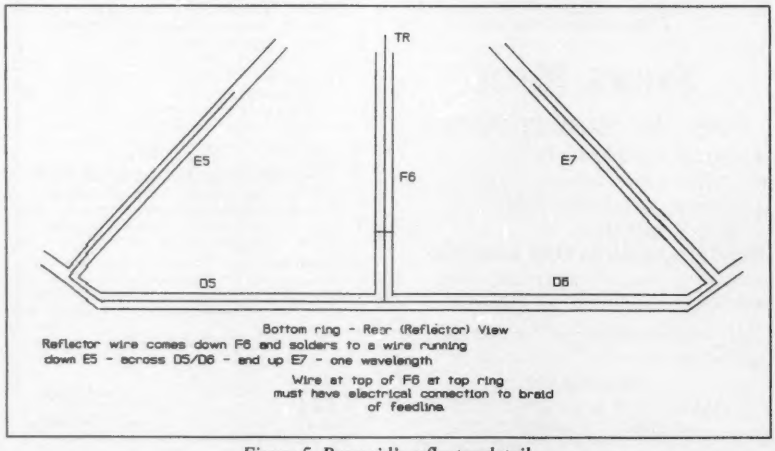
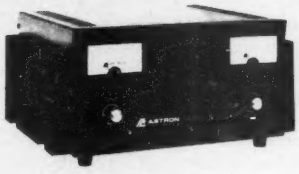

TR
E5
F6
E7
D5
D6
Bottom ring - Rear (Reflector) View
Reflector wire comes down F6 and solders to a wire running down E5 - across D5/D6 - and up E7 - one wavelength
Wire at top of F6 at top ring must have electrical connection to braid of feedline

Figure 5. Pyramid's reflector detail.

ASTRON CORPORATION
9 Autry
Irvine, CA 92718
(714) 458-7277 • FAX (714) 458-0826

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •



MODEL VS-50M

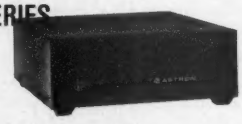
SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-3A, RS-4A, RS-5A, RS-4L, RS-5L
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD except for RS-3A
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

- INPUT VOLTAGE: 105-125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE Less than 5mv peak to peak (full load & low line)
- All units available in 220 VAC input voltage (except for SL-11A)

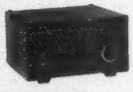
SL SERIES



- LOW PROFILE POWER SUPPLY

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

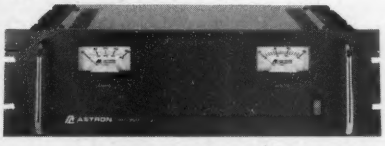
RS-L SERIES



- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

RM SERIES



MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

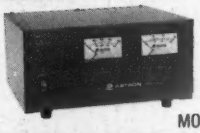
MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

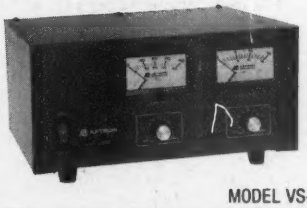
RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

VS-M AND VRM-M SERIES



MODEL VS-35M

- Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

- Built in speaker

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	•	•	5	7	4 × 7½ × 10¾	10
RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD

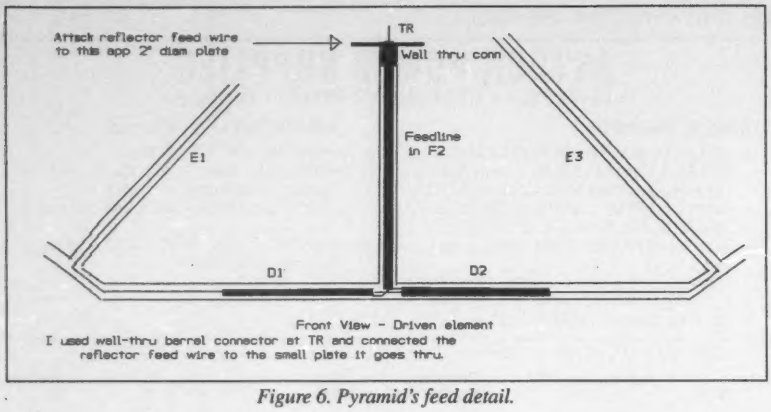

Attach reflector feed wire to this app 2" diam plate
TR
Wall thru conn
Feedline in F2
E1
E3
D1
D2
Front View - Driven element
I used wall-thru barrel connector at TR and connected the reflector feed wire to the small plate it goes thru.

Figure 6. Pyramid's feed detail.

the lower ring, turns, and continues about two-thirds or more of the way back up the back corner tubes. The shape is like a large triangle, not quite closed at the top, and fed at the bottom center (see Figure 5).

Sound Assembly

See Figure 6. It is now time to turn all these carefully cut and crafted pieces into a real working antenna. Take your time feeding the wires through the PVC tubes or kinks and cursing will result. I have found the old "tie a string to a fishing sinker small enough to drop through tubings, and then tie on the cable being pulled, and pull it" trick to work like a champ. If you are not a fisherman, and I'm not, it is still worth buying a sinker just for this job. It is the perfect size (you choose the right one), and shape (teardrop) to do the job. Now that you know all of the lower ring fits together, carefully take the driven leg "T" apart. Slip each half of the bi-square into the "T" open end and head each half out opposite ends of the "T." Be sure the shorter end goes out the direction of D1, and the longer end out the end in the direction of D2. Feed these parts of the antenna out through D1 and D2 respectively. Center the feed in the "T" between D1 and D2. When all is nicely centered, with no kinks, and a smooth-looking "Y" as in the feedline drawing, fill this "T" with RTV, a small amount at a time, working from the center outwards. This is your final weatherseal, so do it slowly and carefully. While the RTV is drying, go to the back center of the Pyramid to the "T" between D5 and D6. Run the reflector element through the correct D5 and D6 tubes. This will no doubt require disconnecting corners, so go all the way around the lower ring and disconnect all non-cemented connections. Remember, the first fit was just a trial fit. Now you are loading the antenna real parts into the tubes, and when reassembled the next time you will cement things together.

By the time you work the reflector wire through the back lower tubes and around the lower corners, through the correct "T" parts and up two more 10-foot PCV tubes that become "E" part back corners, the RTV should be dry. Leave the feed part of the reflector just lying on the ground and running toward the center for now. I found the next assembly to work for me after trying many different ways. Take any one of the 10-foot-long "E" tubes and lay it in the corner connecting the upper ring and the lower ring at point 1. You must now find a stable means to support the center ring about 3'4" off the ground. Small stepladders are just about close enough, or some kitchen stools, sawhorses, or whatever means you have to support the ring at this height. Now fit the #1 "E" tube into the "T" at #1 upper ring corner and cement it into the "T." *Do not* cement any other part(s) of the "T." Do the same at the corner "E" tubes at #3, #5, and #7 corners. You can cement any "E" tube into its "T" at each corner—but not other parts of the "T." This is very important, as the "T" parts of the upper ring eventually must slope downward at about a 30- to 40-degree angle, just as the "T" connections at all the lower ring points must slope upward. The exact amount you will next find out by actually forming the Pyramid. Take each corner 1-3-5-7 in turn and cement the "T" of that corner at the lower ring "T" point. Be careful not to spill any cement into the lower "T" fittings and thus welding the "T's" ability to rotate upward. When four corners are done, you will have a Pyramid top and sides, and as you reassemble the lower ring pieces, the lower ring will come back together. Go around the lower ring cementing *only* the corners at 1-3-5-7, and being sure the "T" at each of those corners slopes upward directly toward the upper ring. The tubes do bow a bit, so try to keep a line through the lower "T," a corner tube "E,' and its upper ring "T" as a straight line, as that removes a lot of twist stress when the antenna is later hung from the center of the top or upper ring. Leave the "F" tubes and center front/rear/sides "T" parts *not* cemented. Using the four remaining PVC tubes, make your "F" tubes by cutting them as follows:

Turn the "T" on the lower ring and the upper ring to face each other, much the same as you did the corners. Now measure between the open ends of the upper and lower "T," and add one inch. The add is for the 1/2" that goes into each "T" at each end of the tube. This is a careful measure-and-fit operation, but not critical. If it's just a bit short it will bow the Pyramid's base upward a bit at the center sides. If it's a bit too long, it will bow it downward. These tubes are mainly mechanical support to prevent sagging between the corners. Mine were cut to fit, and if you do all your other cutting carefully, that should work for you as well. Slip one of these over the reflector feed wire at the back center, and feed the other end out through the upper "T" at #6, where the second upper "T" with the hole is located. If twinlead is used, or larger gauge wires, etc., then you may have to enlarge this hole to suit, or solder a wire to feed through the hole onto the reflector feed. You are trying to reach the center hub, where these wires will ground the reflector to the mast, coaxial feedline shield, and all grounds. Do the same with the coax feedline through the front "F" tube running between the upper "T" #2 and the lower "T" #2 that got the RTV filling. This gets the feedline back up to the upper ring and the mast.

When all this is in place, begin cementing these "F" tubes in place, upper and lower, all around the Pyramid at locations 2-4-6-8. A word to the wise at this point: When fully assembled, it can be difficult to tell a cemented joint from a tight joint under tension from all the other parts—until the whole thing falls apart when it's 16 feet in the air!

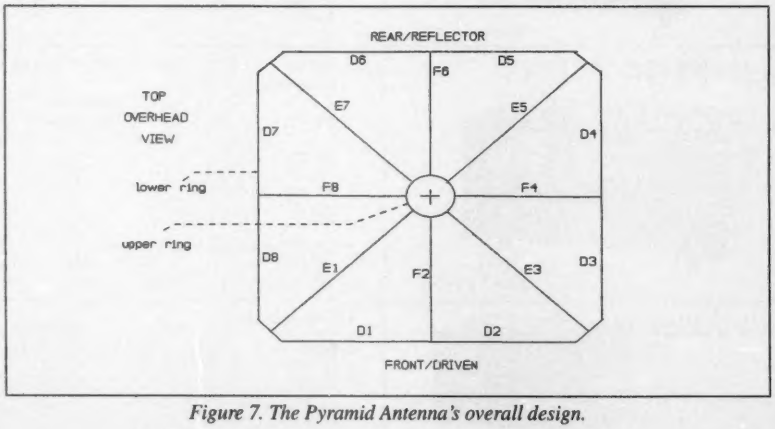


Figure 7. The Pyramid Antenna's overall design.

ORDER NOW 1-800 4 HOBBY KITS

- 2 Meters
- 223 MHz
- 440 MHz
- 6 Meters

FANTASTIC FM TRANSCEIVERS

Ramsey breaks the price barrier on FM rigs! The FX is ideal for shack, portable or mobile. The wide frequency coverage and programmable repeater splits makes the FX the perfect rig for Amateur, CAP or MARS applications. Packeteers really appreciate the dedicated packet port, "TRUE-FM" signal and almost instant T/R switching. High speed packet? ...No problem. Twelve diode programmed channels, 5W RF output, sensitive dual conversion receiver and proven EASY assembly. Why pay more for a used foreign rig when you can have one AMERICAN MADE (by you) for less. Comes complete less case and speaker mike. Order our matching case and knob set for that pro look.

FX-50 kit (6 Meters) $149.95
FX-223 kit (1 1/4 Meters) $149.95
CFX matching case set.....$29.95
FX-146 kit (2 Meters).....$149.95
FX-440 kit (3/4 Meters).....$169.96
FXM-1, ICOM/Yaesu style speaker mike $29.95

QRP AMPLIFIER

For a slick little QRP boost, use one of the 20 Watt amplifiers. Needs only 1/2-2 watts of drive for full output, linear for SSB, AM or CW operation, power MOSFETs for high effiecency and multistage low pass filter for a clean signal. Built-in T/R relay for automatic switching, runs on 12-15 VDC at 2-4 amps. Add our matching case set for a complete station look.

Your choice of bands.....$49.95
Specify band: (QAMP-20, 30, 40, 80)
QAMP Matching case set.....$14.95

2WAY RADIO SERVICE MONITOR

COM-3, the world's most popular low-cost service monitor. For shops big or small, the COM-3 delivers advanced capabilities for a fantastic price—and our new lease program allows you to own a COM-3 for less than $3.00 a day. Features • Direct entry keyboard with programmable memory • Audio & transmitter frequency counter • LED bar graph frequency/error deviation display • 0.1-10.000 µV output levels • High receive sensitivity, less than 5 µV • 100 kHz to 999.9995 MHz • Continuous frequency coverage • Transmit protection, up to 100 watts • CTS tone encoder • 1 KHz and external modulation.

COM-3 2 Way Radio Service Monitor $2995.00

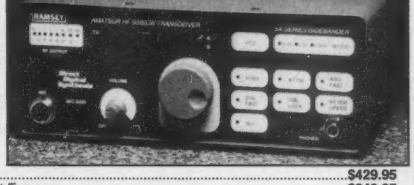
2 MTR & 220 BOOSTER AMPS

Here's a great booster for any 2 meter or 220 MHz hand-held unit. These power boosters deliver over 30 watts of output, allowing you to hit the repeater's full quieting while the low noise preamp remarkably improves reception. Ramsey Electronics has sold thousands of 2 meter amp kits, but now we offer completely wired and tested 2 meter, as well as 220 MHz units. Both have all the features of the high-priced boosters at a fraction of the cost.

PA-10 2 MTR POWER BOOSTER (10 X power gain)
Fully wired & tested $99.95
PA-20 220 MHz POWER BOOSTER (8 X power gain) Fully wired & tested $99.95

SX-20 20 METER SSB/CW TRANSCEIVER

Finally, a handy go anywhere rig that puts the fun back into ham radio. How about the DDS synthesizer that tunes in 10 Hz steps with exceptionally low noise for weak signal reception. Or, how about the built-in lambic CW keyer that has a digital readout of your CW speed. Perky 10 watt RF output (that's only 11/2S units below a 100 watt rig!) can be tuned down for true QRP operation. Included with the SX-20 is the hand mike with handy UP/DOWN buttons for remote tuning of the rig while driving — or biking — or boating. Available in both fully assembled and fun to build kit form, you'll find that the SX-20 will become your favorite rig.



SX-20 20 meter SSB/CW Transceiver, fully wired, 1 yr. warranty $429.95
SX-20 20 meter SSB/CW Transceiver Kit Form.....$349.95
Optional CW Audio Filter SXCWN WT.....$49.95 Kit $39.95

Miniature SPEAKER-MIKE

Fits Icom, Yaesu, Alinco, Ramsey and Radio Shack rigs! Looking for a handy little speaker-mike to compliment your FX transceiver or other ICOM style handie-talkie? The Ramsey SM-1 speaker-mike is a beauty. It's only 1 1/2" wide by 2 1/2 inches high and has a handy clip on the back so you can easily clip it to your lapel or shirt. Its small internal speaker isn't going to break any eardrums but is very clear and has plenty of pop to be heard when worn. There's even a jack on the mike so when you plug it in, you still have the use of the speaker jack from your radio. Fits all Radio Shack, ICOM, Yaesu, Alinco and Ramsey rigs.

SM-7 Mini-Speaker mike,
Fully assembled.....$24.95

CW KEYER

Send perfect CW. Microprocessor keyer features 4 programmable memories of up to 26 words each, lambic keying, dot-dash memory, variable speed from 3-60 WPM, adjustable sidetone, keying to any rig and fully RFI proof. EAROM memory keeps messages up to 100 years - you'll go silent before the key! Includes built-in touch paddles or use your own. Easy assembly and matching case set available for a nice station look.

CW-700 Micro keyer kit.....$69.95 MK Matching case set..... $14.95
CW-700WT Assembled CW-700and case $119.95

ACTIVE ANTENNA

Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!

AA-7Kit.....$28.95 Matching case & knobset, CAA ..$14.95

AIRCRAFT RECEIVER

Hear exciting aircraft communications—pick up planes up to 100 miles away! Receives 110-136 MHz AM air band, smooth varactor tuning superhet with AGC, ceramic filter, adjustable squelch, excellent sensitivity and lots of speaker volume. Runs on 9V battery. Great for air shows or just hanging around the airport! New 30-page manual details pilot talk, too. Add case set for "pro" look.

AR-1 kit $29.95
Matching case set, CAR $14.95

SHORTWAVE RECEIVER

Fantastic receiver that captures the world with just a 12" antenna! Can receive any 2 MHz portion from 4-11 MHz. True superhet, has smooth varactor tuning. AGC, RF gain control, plenty of speaker volume and runs on a 9V battery. Fascinating Scout, school or club project, provides hours of fun for even the most serious DXer. For the car, consider our shortwave converter. Two switchable bands (in 3-22 MHz range), each 1 MHz wide—tunable on your car radio dial. Add some interest to your drive home!

Shortwave receiver kit, SR1.....$29.95
Shortwave converter kit, SC1.....$27.95
Matching case set for SR1, CSR .. $14.95
Matching case set for SCI, CSC ...$14.95

2M POWER AMP

Easy to build power amp has 8 times power gain, 1W in, 8W out, 2W in, 16W out, 5W is for 40W out. Same amp as featured in many ham magazine articles. Complete with all parts, less case and T-R relay.

PA-1, 40W pwr amp kit.....$34.95
TR-1, RF sensed T-R relay kit.....$14.95

MINI KITS

Ramsey carries a complete line of low cost, easy to build, easy to use functional kits that can be used alone or as building blocks in larger more complex designs. Mini-kits include audio amps, tone decoders, VOX switches, timers, audio alarms, noise-makers and even shocking kits! Call for our free catalogue!

MORE KITS NEXT MONTH'S ISSUE

FOXHUNT HEADQUARTERS

Locate hidden or unknown transmitters fast. The Foxhound direction finder connects to the antenna and speaker jack on any radio receiver, AM or FM from 1 MHz to 1 GHz. The antenna (a pair of dipole telescopic whips) is rotaled until the Null meter shows a minimum. A pair of LEDs indicate to turn Left or Right. The Foxhound is ideal to use with a walkie-talkie. If you wish to transmit, go ahead, a built-in T/R switch senses any transmitted RF and switches itself out of circuit while you talk. It doesn't get any easier than this! We provide all parts except for a few feet of 1/2 inch PVC pipe avialable at any hardwar e store for a dollar or two. Add our matching case set for a complete finished unit. Be the one with the answers, win those transmitter hunts and track down those jammers, you'll do it all with your Foxhound.

Add some fun to your club events by having a transmitter hunt! Foxhunting is a craze sweeping the nation, but many clubs are missing out on the action because they lack the expertise or time to develop their own foxhunt transmitter. We set one of our most devious and sneaky engineers to the task of designing an easy to build and use, yet highly capable Foxhunt transmitter. A snazzy microprocessor controller has both preset and programmable transmission characteristics allowing you to easily set the difficulty level from "beginner" to "know-it-all"! The SlyFox, FHT-1, is crystal controlled in the 2 meter band (crystal for 146.52 included) with a power output of 5 watts that is adjustable by the controller.The transmitter is programmed to ID in CW or add our voice option if you really want to aggravate the troops - "Ha ha, you can't find me!" Join the fun, get rid of those stuffy old meetings and picnics, have a foxhunt!

DF-1 Foxhound direction finder kit .....$59.95 CDF Matching case set for DF-1 ....$14.95
FHT-1 SlyFox Foxhunt transmitter kit .$129.95 FHID-1 Voice ID option.....$29.95
CFHT Heavy duty metal matching case set for FH T-1 .....$29.95

PACKET RADIO

Two new versions are available for the Commodore 64 (P-64A) or the IBM-PC (P-IBM). Easy assembly NO TUNING". Includes FREE disk software, PC Board and Full Documentation. Kit form.

P-64A.....$59.95 P-IBM .....$59.95 CASE CPK.....$14.95

STEREO FM TRANSMITTER

Run your own Stereo FM radio station! Transmits a stable signal in the 88-108 MHz FM broadcast band up to 1 mile. Detailed manual provides helpful info on FCC regs, antenna ideas and range to expect. Latest design features adjustable line level inputs, pre-emphasis and crystal controlled subcarrier. Connects to any CD or tape player, mike mixer or radio. Includes free tuning tool too! For a pro look add our matching case set with on-board whip antenna

FM-10A Stereo transmitter kit.. $34.95
CFM Case,whip ant set..... $14.95

SPEECH SCRAMBLER

Descramble most scramble systems heard on your scanner radio or set up your own scambled communication system over the phone or radio. Latest 3rd generation IC is used for fantastic audio quality - equivalent to over 30 op-amps and mixers! Crystal controlled for crystal clear sound with a built-in 2 watt audio amp for direct radio hook-up. For scramble systems, each user has a unit for full duplex operation. Communicate in privacy with the SS-70. Add our case set for a fine professional finish.

SS-70 Scrambler /descramblerkit .$39.95
CaSD matching case set.....$14.95
SS-70WT Assembled
SS-70 and case set $79.95

MICRO-MIKE

World's smallest FM wireless mike. Smaller than a sugur cube - including battery and mike. Two sets of SMT parts supplied in case you are clumsy! Terrific audio pick-up (pin drop at 5 ft) and transmit range of 300 ft. We include the battery (watch style), electret mike and even a tuning tool! Be a James Bond and learn SMT too!

FM-5 Micro mike kit.....$19.95

CRYSTAL RADIO

Relive the radio past with a crystal set like your grandfather built. Uses genuine Galena crystal and catwhisker. Several different types of radios are built, including standard AM broadcast, shortwave and even WW II foxhole style. To compare modern semiconductor detectors, we include a diode for comparison. No soldering required and we even give antenna ideas. Radio for free, get it now before Clinton taxes it!

CS-1 Crystal set kit $19.95

DR. NI-CAD CONDITIONER/FAST CHARGER

Quit spending big bucks for replacement battery packs, rejuvenate and condition your batteries for peak capacity. Advanced circuitry has optimized discharge before charge to eliminate memory effect and to condition batteries that have been poorly cared for in the past. Quick charge rapidly brings battery to full charge in less than an hour-just 15 minutes for some types! And "top-off" charge mode squeezes every last bit of energy into each cell for the absolute most capacity. Switch-mode regulator controls constant current charge while being monitored by a negative delta-V system that cuts off the fast charge at the exact point of full charge-batteries are charged, not cooked! Charges NiCads or NiMH packs from 2 to 10 cells (easily expanded) and current capacities up to 10 Amp-hours. Runs on 12 to 15 VDC. Quit cooking your batteries, buying new packs, waiting hours for recharge, get a Dr. Ni-Cad today! Available in money saving kit form or wired and tested with case at a special price. Kit builders: add our matching case set for a snazzy finish.

DN-1 Dr. Ni-Cad conditioner/fast charger kit $49.95
CDN Matching case set.....$14.95
DN-1WT Fully assembled Dr. Ni-Cad with case.....$69.95

ORDERS CALL 1-800-4 HOBBY KITS (446-2295) ORDERS ONLY
TECH/ORDER/INFO (716)924-4560 FAX (716)924-4555

TERMS: Satisfaction guaranteed. Examine for 10 days. If not pleased return in original form for refund. Add $4.95 for shipping, handling and insurance. For foreign orders add 20% for surface mail. COD (U.S. only) add $5.00. Orders under $20 add $3.00 NY residents add 7% sales tax. 90-day parts warranty on kit parts. 1-year parts & labor warranty on wired units.

RAMSEY ELECTRONICS, INC 793 CANNING PARKWAY VICTOR NY 14564

CIRCLE 34 ON READER SEVICE CARD

Do use some means to mark the outside of every joint you cement as you cement it. Tape you can later remove (black/red/yellow high visibility), or magic markers like that work really well. When you are finished and ready to raise the beast, you want to be able to do a walk-around-the-whole-thing inspection and find loose ends at a glance.

Assembly Tips

I discovered a few helpful hints on the final assembly trail, and hope they make assembly for you a lot easier than my first try (live and learn). When cementing the last of the bottom ring, give up any hope of the twist assembly method. Just coat the tube part, insert in joiner, and hold 15-30 seconds. The same holds for all the final assembly of the upper ring, which you can now do. Just coat all the way around the tube for about 1/2" that is going into the joiner, and insert the tube straight in, keeping the overall ring flat.

For those of you with machining and aluminum plate at your disposal, the mounting plate for the upper ring could be 1/4" aluminum plate. I have no such source, so 3/4" marine-grade plywood has done well for me for years. Use a piece 2" larger around than the ring's outer diameter, and give the wood several light coats of marine-grade varnish or other weatherproofing material. Rustoleum "Wood Saver" paint also seems to do well, but is a relatively new product, and I'm just now doing some testing on it myself. After the first few soaking coats of whatever you decide to weatherproof with (aluminum users skip on), drill holes to pass the legs of U-bolts that will wrap around each part "C" in the upper ring and through the plate (16 in all). These can and should be light-duty 3/16" variety U-bolts used throughout the TV antenna industry and available in most hardware and discount stores. Heavier U-bolts would have been fewer in number maybe, but harder to find and of a strength really not necessary. Using the lighter version U-bolts allows more distribution of the stress points where the antenna mounts, and spreads that stress when the wind starts blowing things around. To be sure, the antenna will bob around a bit in the wind, as overall it is quite light for its size. Not to worry, mine made it through 64 mph winds this year, and kept on tickin'. Mounting from the plate to the support mast is left to the user, but I found floor flanges to work very well. Take time to find aluminum types used in office/factory handrails and pallet shelves if possible. They don't rust, and tend to have higher collars on them. The latter I like to drill and tap holes at 120-degree spread around the collar and run into them 3/16" to 1/4" bolts about 1" to 1-1/2" long. This stops the obvious, "If I can screw it onto the upright mast, the wind can surely 'unscrew' it!" Take time to seal the plywood edges, if used, and whatever you do, do not use any kind of chip or particle board. The strength is just not there.

I hope you find the antenna as easy to build and as much fun to use as I have. At only 16.5 feet up (through the center line of the lower ring), or about 20 feet even at the center plate, it is quite a worthy performer. It took quite a bit of fiddling to decide how much reflector to use and where to run it, as well as the guts to try this type of a driven element, but I had all those years to evaluate all the smaller parts of this antenna. I even built scaled-down VHF models for the first time in my life, and hey, scaling does work—sort of. And if all else fails, and the band goes all quiet, you can always go sit under it (power OFF of course), and test the other theories of pyramid power.

If I can help you in any way, just drop me a line (14670 N. Cumberland Rd., Noblesville, Indiana 46060). Please include an S.A.S.E. and allow a few days for me to to digest your question and reply. 73

Parts List and Specifications

Type of pipe/tubing used: White PVC plumbing pipe; 1/2" Crestline (or equivalent), schedule 40, PVC 1120, 400 PSI. Black and gray are usually sold as electrical conduit. There is a tan PVC that is for hot water and is higher in cost, with no increase in value as used in this project. Overall, the white PVC cold-water pipe is the least expensive, and is more than sufficient for strength.

Cement used: Hercules brand, clear, PVC, medium body, medium set plastic pipe cement; up to 6" diameter; schedules 40 & 80.

Parts:

PVC tubing as above	1/2", white, app. 7/8" o.d.	17
PVC connectors	45-degree, ELL	16
PVC connectors	Three-way joiner, T	16
Can of cement	To join tubing and joiners	1
3/4" plywood	Marine if possible, app. 24" x 24"	1
Pipe floor flange	Minimum 1-1/2", four-hole mounting (to suit vertical support pipe coming from rotator	1
U-bolts	Aluminum or plated hardware, with legs long enough to encircle tubing and go through plywood mounting plate, app. 1-1/4"	8
Coaxial cable	RG-58, solid-center conductor	App. 50 ft.
RF connector	As appropriate to connect to lead-in to shack (BNC fittings were used, but PL-259 type are adequate)	1

Approximately a pound of care and patience (be sure to prefit and try everything before you glue—the glue works, fast)

References: Charles Whysall W8TV, "The Double-Bazooka," *QST*, July 1968. p.38.

John Schultz W2EEY, "The Double Coaxial," *73 Magazine*, June 1973, p.79.

From Micro Computer Concepts
RC-1000 REPEATER CONTROLLER
• Autopatch • Reverse Autopatch
• User Programmable CW ID,
Control & User Codes & Timeouts
Manual with schematics • 90-Day Warranty
Wired & Tested w/ manual $239.95
VISA MasterCard
Micro Computer Concepts
8849 Gum Tree Ave.
New Port Richey, FL 34653
813-376-6575
CIRCLE 160 ON READER SERVICE CARD

UHF REPEATER
Make high quality UHF repeaters from GE Master II mobiles!
• 40 Watt Mobile-Radio $199
• Duplexing & tuning information $12
• Information without radio $40
Versatel Communications
Orders 1-800-456-5548 For info. 307-266-1700
P.O. Box 4012 • Casper, Wyoming 82604
CIRCLE 259 ON READER SERVICE CARD

PAY TV AND SATELLITE DESCRAMBLING
All New Info VOLUME 6 All New Info
• Volume 6 — our best yet — details all known fixes for all cable, wireless and satellite systems. Many do-it-yourself. Schematics included, only $15.95.
• Pay TV Volumes 1-5 (all different) • Hacker Video(VHS)
• Wireless Cable Hacking • Build Satellite Systems (includes DBS)
• Complete Wizard (VC2+) • All these titles, $15.95 each, 3/$34.95, 5/$52.95
• Monthly newsletter $29.95/yr. • new catalog $1 • All our info $129.95
SCRAMBLING NEWS
1552 Hertel Ave. #123, Buffalo, NY 14216
Voice/FAX/BBS 716-874-2088
C.O.D.'s are OK Add $6
CIRCLE 36 ON READER SERVICE CARD

Subscribe to
73 Amateur Radio Today
Call 800-289-0388

THE SOTRON
COMPACT ANTENNAS FROM 160-10 METERS
NO TUNERS
NO RADIALS
NO RESISTORS
NO COMPROMISE
FIVE EXCELLENT REVIEWS JUST DON'T HAPPEN BY CHANCE
CALL US FOR A FREE CATALOG.
*See review in Oct. 73, 1984 *Sept. 73, 1985 March 73, 1986
CQ, Dec. 1988 Mar. W.R. 91
BILAL COMPANY
137 Manchester Drive
Florissant, Colorado 80816
(719) 687-0650
VISA MasterCard
CIRCLE 42 ON READER SERVICE CARD

WE SHIP WORLDWIDE

Barry Electronics Corp.

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

For the best buys in town call:
212-925-7000
Los Precios Mas Bajos en Nueva York
WE SHIP WORLDWIDE!
Export orders expedited.

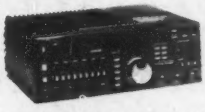
KITTY SAYS: WE ARE OPEN 7 DAYS A WEEK
Sat. 10-5 Sun 11-4 M-F 9-6 Come to Barry's for the best buys in town

Wherever I go, I take my radio.
Specialist in RADIOS;
Business marine aviation,
ham radios and scanners.

MOTOROLA SP10, SP50, P110, GP3000, M120, GM300, GR300 repeaters.
Domestic, exports and gov't. orders.

ICOM 281-H, 481-H, 2340-H, 2700-H, IC-D100, GP-22A
ICOM Business Radios
New F30LT/F40LT, H16, U16, V100, and repeaters

Yaesu Vertex Portables
FTH-2070 dual band VHF/UHF 5 watts VX500, FTH 2008/7008/VTR 5000 repeater



CONTACT US FOR THE LATEST IN BUSINESS AND HAM RADIOS, SHORTWAVE RECEIVERS & SCANNERS. MOTOROLA, YAESU, ICOM, KENWOOD, ALINCO, STANDARD, MAXON, RELM, BENDIS, KING, SONY, SANGEAN, GRUNDIG

"YAESU Ham & Vertex Business Radios"
FT-890, FRG-100B, FT-1000D, FT-530, FT-5200, FT-530-FT411E, FT-840,FT-900AT, FRG-100B, FT-2400, FT-23R, FL-7000 Linear.
New VXR-5000 synthesized repeater 25 watts, VHF or UHF.

KENWOOD

ANTENNAS
A-S, AES, Cushcraft, Hy-Gain, Hustler, KLM, METZ, Urban, MODUBLOX, TONNA, Buttemut, Multi-Band

"TS-50S", TS450S/AT, R-5000, TS-850S, TM 241/A/441A, TR-751A, Kenwood Service Repair, TS140S, TS690S, RZ-1, TS-790A, TS950SD, TH-78A, TH28/48A, TM-941A, TM-741A, TM-732A, TM-641A, TM-742A.

SCANNERS
AOR: 900, 1000, 1500, 2500, 2800, 3000A
ICOM: R-1, R100, R71A, R72A, R7000, R7100, R9000
Bearcat

MARINE RADIOS
ICOM M7, M11, M56, M700TY, M800
AVIATION PORTABLE ICOM A-21
MOTOROLA MARINE KING KX 99

YAESU ICOM
FT-23R/26/76 IC2/3/4SAT
FT411E-811-911 IC02AT/2SRA
FTH-2008/7008 IC2/4GAT/24AT
IC-A21/U16

ICOM HANDHELDS
2GXAT, 4GXAT, T21A, W21AT, V21AT, X21AT.
ICOM Repeaters VHF or UHF Synthesized

Landmobile HT's
ICOM: U16, H16, V100, U400
MAXON, MOTOROLA,
YAESU: FTH 2008/7008
UNIDEN, REGENCY, KING,
MARINE ICOM: M7, M56, M700
AVIATION ICOM: A21 A200 H.T., TAD

Telephone Autopatch
Patches telephone calls from your radio to phone line, Great for making and receiving phone calls where there are no phone lines. Simple to use. Write or fax for inquires.

TCS- Ultralite
Ultimate, transportable telephone communication terminal. Make and receive phone calls, fax, telex anywhere in the world where there are no phone lines. Small, compact with 1.2 meter dish. Fits in suitcase. Mil. Std. 810 specs. Write or call.

Save money on batteries.
Ask for Special Prices.

Surveillance Devices Available

Linear Amplifier
Ameritron, Icom, Kenwood, Yaesu

W2IAT 2GXAT

IC-H16/U16 IC2IA

MOTOROLA RADIUS COMMERCIAL RADIOS

TH-79A Kenwood

FT-530 Yaesu

Barry's supplies all MFJ products
Call us direct.

Covercraft Coaxseal Stocked

SHORTWAVE RECEIVERS STOCKED

Shortwave Receivers
• SONY • GRUNDIG
• SANGEAN • ICOM
Call 2212-925-7000
Satellite telephone in suitcase for worldwide use. CALL

Computer Interfaces Stocked: MFJ-1270B, MFJ-1274, MFJ-1224, AEA PK-88, MFJ-1278T, PK-900, PK-232 MBX W/FAX, DRSI PRODUCTS DSP 2232

Antenna Tuners:
MFJ, AEA AT-300, ICOM, KENWOOD, YAESU, VERTEX

COMMERCIAL & HAM REPEATERS STOCKED. WRITE FOR QUOTES

Kantronics KAM PLUS, KPC 2/3/4, KPC2400, SUPER FAX II, KPC IV, Data Engine, D4-10, etc.

CB Radios Stocked
148 GT2, Warrington, Ranger 2950-70, Wilson 1000, 10/11 Meter Antennas, Antron, Shakespeare, etc, Astatic power mics, Silver Eagle w/beep, etc.

Wide selection of SW & Amateur Publications

MOTOROLA AUTHORIZED DEALER
KACHINA COMMUNICATIONS DEALER
AUTHORIZED DEALER SONY®
Shortwave Radios Stocked
DIGITAL FREQUENCY COUNTERS
OPTOELECTRONICS model 1300 H/A, 0-1300MHz
2300, 2210 H, 0-2200 MHz, 2600H, UTC-3000, 2810

AMPLIFIERS STOCKED: RF Concepts Mirage TE Systems

Radios for Business, Government.
Stocked & Serviced
Call for Great Prices!

ALINCO DJ-580T, DJ-582T, DJ-F1T, DJ-F1TH, DR-130/430T, DJ-180T/TH

BIRD Wattmeters & Elements In Stock

COMET ANTENNAS STOCKED

Privacy scramblers for radios and phones. CALL

ANTENNAS: AEA, AlphaDelta, ANLI, Antenna Specialist, Barker & Williamson, Comet, Cushcraft, Diamond, GAP, Hy-Gain, Hustler, Larsen, Etc.

(144, 220, 440 MHz), Isoloop.

EIMAC 3-500Z 572B, 6JS6C 12BY7A & 6146B

BIRD Wattmeters & Elements In Stock

Long-range Wireless telephone for overseas. CALL

BENCHER PADDLES
BALUNS, LOW PASS FILTERS
IN STOCK

MIRAGE/RFC Amplifiers
ASTRON POWER SUPPLES
Belden Wire & Cable, Int'l Wire
OPTOELECTRONICS STOCKED

Shortwave Radios
JRC, ICOM, KENWOOD, YAESU, SONY and GRUNDIG

Hy-Gain Towers will be shipped direct to you FREE of shipping cost.

Amplifiers, HF/VHF/UHF AMERITRON, etc.

BARRY ELECTRONICS CORP., 540 BROADWAY, NY, NY 10012 (Five blocks N. of Canal St., between Spring & Prince St.) **FAX 212-925-7001 Phone 212-925-7000**

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

"Aqui Se Habla Espanol"
BARRY INTERNATIONAL
FAX 212-925-7001 Phone 212-925-7000
For Orders Call 1-800-990-2929
Monday-Friday 9 A.M to 6:00 P.M.
Saturday 10- 5pm /Sunday 11- 2pm

Subways: #6 Spring St. stop, N. train to Prince St., F train to Houston St.
Bus: Broadway bus to Prince St., Path 9th St./6th Ave.

COMMERCIAL RADIOS STOCKED: ICOM, Motorola, MAXON, Standard, Yaesu. We serve municipalities, businesses, Civil Defense, etc. Portables, mobiles, bases, repeaters...

We stock: AEA, Alinco, Ameco, Ameritron, Antenna Specialist, ARRL, Astatic, Astron, B&K, Belden, Bencher, Bird, Bitternut, CES, Cushcraft, Condan, Daiwa, Elmac, Henry Heil, Hustler, Hy-Gain, Icom, KLM, Kantronics, Kenwood, Larsen, Maxon, MFJ, Mirage, Motorola, Nye, Palomar, RF Products, Shure, Standard, TUBES & Tube Cartons Uniden, Yaesu, Vibroflex, Duplexers, Repeaters, Scanners Radio Publications.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS
HAM DEALER INQUIRES INVITED PHONE IN YOUR ORDER & BE REIMBURSED
COMMERCIAL RADIOS stocked & serviced on premises.
Amateur Radio Courses Given On Our Premises, Call
Export Orders Shipped Immediately.

ALL SALES FINAL

Technical help offered upon purchase

FAX: 212-925-7001

CIRCLE 41 ON READER SERVICE CARD

Using GE Progress Line Receiver Strips

A low-tech solution for many situations.

by Robert B. Whitaker KI5PG

Like most hams, I am a terrible pack rat. I hate to get rid of anything that still has some use or value left in it. In recent years, manufacturers and advertisers have done a good job of convincing us that we always need the newest, highest technology gear to solve our problems. Often, however, we don't need state-of-the-art equipment to meet our needs. In many situations, a simple and inexpensive solution is just what is called for. This article will describe how to use General Electric Progress Line VHF and UHF receiver sections as practical stand-alone receivers without bulky cables, control heads, and heavy cases.

General Electric designed and produced the Progress Line series of radios back in the 1960s. These radios were widely used and are still widely available today at very low prices. I've talked to a number of hams who still use these old radios and are very pleased with them. I will not cover the transmitters since they use now-scarce vacuum tubes for the power amplifiers. Perhaps another writer can pick up that topic.

These crystal-controlled receivers can be used for quite a number of practical monitoring purposes, such as monitoring local repeaters, weather radio broadcasts, and police or volunteer fire department frequencies. They also make excellent receivers for repeater systems or control links for repeaters. Some receivers have an optional subaudible tone access (called Channel Guard, by GE) which is especially well-suited for repeaters or control links.

Where to Hunt for Older Radios

These GE Progress Line radios, like many older radios, can commonly be found for rock-bottom prices at swapfests, usually for $15 or less. Manuals, which are a little more scarce, can often be picked up at the same time. Other good sources for the radios are local commercial radio dealers. Many dealers will just give them to you to get them out of storage. If your city or county has surplus equipment auctions, you will find these and other good radios at great values. Even used commercial vendors sell these radios at good prices. Shipping weights increase costs for mail order but these dealers will often have a wide selection of radios and just the proper tone elements, accessories, or manuals.

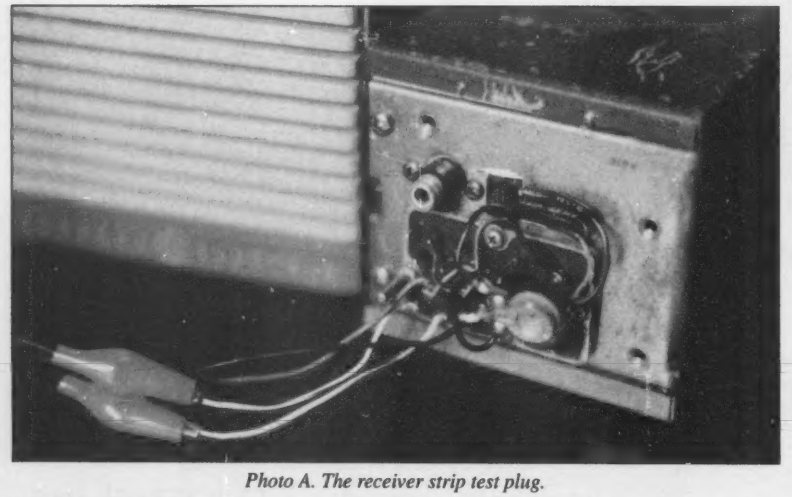


Photo A. The receiver strip test plug.

Photo B. The receiver strip shown wired for permanent use.

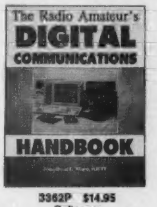
I spoke to one ham in California, John Lansdell WA6HRH, who has almost 100 of the Progress Line radios. He offered to sell the whole radios, or just receiver sections alone, at a ridiculously low price. John's phone number is (909) 873-1319.

Wiring the Receiver Strips

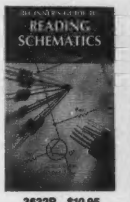
The same receiver strips for the Progress Line series were used both in mobile radios and in base stations or repeaters. They are easily interchangeable. The VHF and UHF models are identical in their outward appearance, and wiring for either band is the same. The receivers are all solid-state and have held up well over the years since they were manufactured. They require only a handful of parts for separate (external) operation. A 10-volt regulated power supply, a 13-volt power supply and trimpots for volume and squelch controls are all that are needed.

The regulated +10 volt power is easily supplied with a 7810 regulator. The 7810 is a little harder to locate than the more versa-

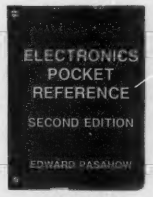
3258P $19.95
Softcover



3362P $14.95
Softcover



3632P $10.95
Softcover



0487375 $24.95
Softcover

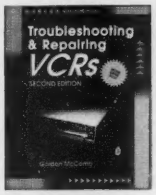
4231H $19.95

4227P $15.95
Softcover

0404348-XX $49.50
Counts as 2

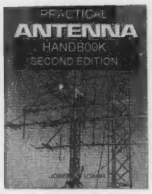
4359P $19.95
Softcover

0322841-XX $60.00
Counts as 2



3777H $32.95

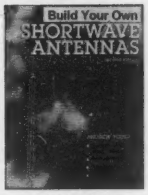
3756P $19.95
Softcover



0111049-XX $49.95
Counts as 2

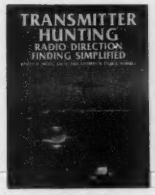
0443017-XX $40.00
Counts as 2

4354P $19.95
Softcover



0765340 $16.95

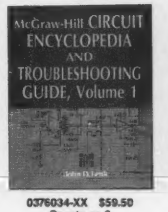
1367P $29.95
Softcover



2701P $19.95
Softcover

2613P $19.95
Counts as 2

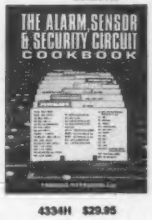
032361X-XXX $119.50
Counts as 3



0376034-XX $59.50
Counts as 2

4179H $28.95

4213H-XX $50.00
Counts as 2

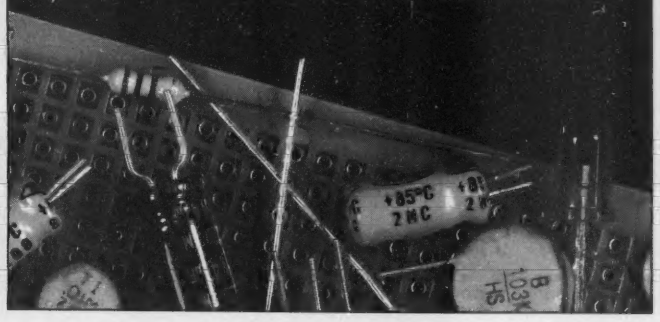


4334H $29.95

Select any 5 books for only $4.95

values to $146.75

when you join the Electronics Book Club®



If card is missing, write to: Electronics Book Club, A Division of McGraw-Hill, P.O. Box 508, Columbus, OH 43216-0810

As a member of the Electronics Book Club . . .

. . . you'll enjoy receiving Club bulletins every 3-4 weeks that contain exciting offers on the latest books in the field—at savings up to 50% off regular publishers' prices. If you want the Main Selection do nothing, it will be shipped automatically. If you want another book, or no book at all, simply return the reply form by the date specified. You'll also have at least 10 days to decide. Plus, you'll automatically be eligible for FREE BOOKS through the Bonus Book Program. Your only obligation is to purchase 3 more books during the next 12 months, after which you may cancel your membership at any time.

Publishers' prices shown. All books are hardcover unless otherwise noted. If you select a book that counts as 2 choices, write the book number in one box and XX in the next. If you select a book that counts as 3 choices, write the book number in one box and XXX in the next 2 boxes. A shipping/handling charge & sales tax will be added to all orders. ©1995 EBC

Your most complete and comprehensive source for the finest electronics books

Electronics Book Club®
A Division of McGraw-Hill, Inc.
P.O. Box 508, Columbus, OH 43216-0508

YES! Please send me the 5 books listed below, for $4.95 plus shipping/handling & tax, and enroll me as a member of the **Electronics Book Club** according to the terms outlined in this ad. If not satisfied, I may return the books within 10 days without obligation and have my membership cancelled.

If you select a book that counts as 2 choices, write the book number in one box and XX in the next.
If you select a counts as 3 choices, write the book number in one box and XXX in the next 2 boxes.

Name _____

Address _____

City _____

State/Zip _____

Phone _____

Valid for new members only, subject to acceptance by EBC. Applicants outside the U.S. and Canada will receive special ordering instructions. Canada *must* remit in U.S. funds drawn on U.S. banks. All books are hardcover unless otherwise noted. A shipping/handling charge & sales tax will be added to all orders.

STAR195

tile 317 regulator but it has a couple of advantages over the 317 regulator. The 7810 does not require a resistor network to set the voltage output as the 317 regulator does. Also, unlike the 317 regulator, the 7810 can be attached directly to the receiver strip case without an insulating spacer since the heatsink tab on the 7810 is the negative common connection. The receiver +10 volt current draw is only 150 miliamps but the regulator will run fairly warm without fastening to the receiver case for heat sink. The only stage of the radio requiring 13 volts is the 5 watt audio power amplifier.

Figure 1 shows the pin outputs of the receiver. If you have a number of the strips, you might want to find a separate plug to use as a test wiring harness, as shown in Photo A. For permanent use you can simply solder connections directly to the pins as shown in Photo B. If your receiver has two or more channels you will need to select the desired channel by strapping that channel pin to +10 volts. The single frequency models are wired internally and do not require this connection.

The receiver remains muted until +10 volts is applied to pin 2, Receiver mute. As originally designed, the +10 volt power was removed from this pin when the transmitter was keyed so the receiver would not operate during transmitting.

If your receiver has the optional channel guard board and a tone element you can invoke channel guard operation by connecting pin 18 to ground. In this mode the receiver will remain muted or squelched except for signals with the correct subaudible tone frequency.

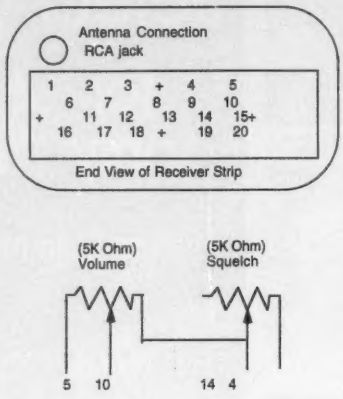
Tuning the Receivers for the Ham Bands

Tuneup on the radios is fairly straightforward. Experience definitely helps, but even a neophyte (like me) can get the hang of it. The information in the sidebar gives basic tuneup directions for the front end of the radios. You don't need a complete test bench with a lot of expensive service equipment. A decent multimeter and a synthesized handheld or mobile radio for signal generation will usually suffice. For complete tuneup, refer to the GE maintenance manual. Most of the VHF strips around these days were designated for VHF operation from 150 to 174 MHz. These receivers almost always will tune down through the entire 2 meter ham band without a problem. The UHF receivers designated to operate from 450 to 470 MHz will also tune down to 440 to 450 MHz operation without problems. GE conveniently provides a test jack for measuring voltages and signal levels in different stages of the receiver. The sidebar describes tuneup techniques for the poor man without access to expensive test equipment.

Using the Receiver Strip in a Repeater System

The metal shielded cases and reliable design of the GE Progress Line receivers make them ideal for repeater use. At a time

GE MASTER PRO Receiver strip connector for both UHF and VHF designs



1. Grourtd
2. Receiver Mute (+10v)
3. Encode Out
4. Squelch High
5. Volume high
6. Frequency 1
7. Frequency 2
8. Frequency 3
9. Frequency 4
10. Volume Arm
11. +12 Input
12. Regulated +10 Input
13. System Negative
14. Volume Low/Squelch Arm
15.
16. Speaker Output 1
17. Speaker Output 2
18. Channel Guard On-Off
19. C.O.S. Feed
20. Monitor Lock

Notes:

1. Connect power leads, volume control, squelch control, and +10 volts input as shown. Connect +10 volts also to Pin# 2 (Receiver Mute) and the Pin to select the frequency if the receiver is a multi-frequency receiver
2. +10 volts should be accurate and well regulated. Use +10 volt 3-terminal voltage regulator or 317 type.
3. On multi channel strips connect frequency select pin to +10v.
4. For Channel Guard Operation (PL) connect Pin 18 to Ground
5. Disconnecting Pin 2 from +10 volts will mute the receiver during transmitting.

VHF MODELS ER-41-C and E
Crystals are GE Part # 19B20657P4
Crsytal frequency = (Operating Freq. - 5.3 Mhz) divided by 9

UHF MODELS ER-42-E and G
Integrated Circuit Oscillator Module (ICOM) are GR Part # 4EG26A10
ICOM freq = (Operating Freq. - 12.4 Mhz) divided by 24

Figure 1. GE Master Pro Receiver strip connector for both VHF and UHF designs.

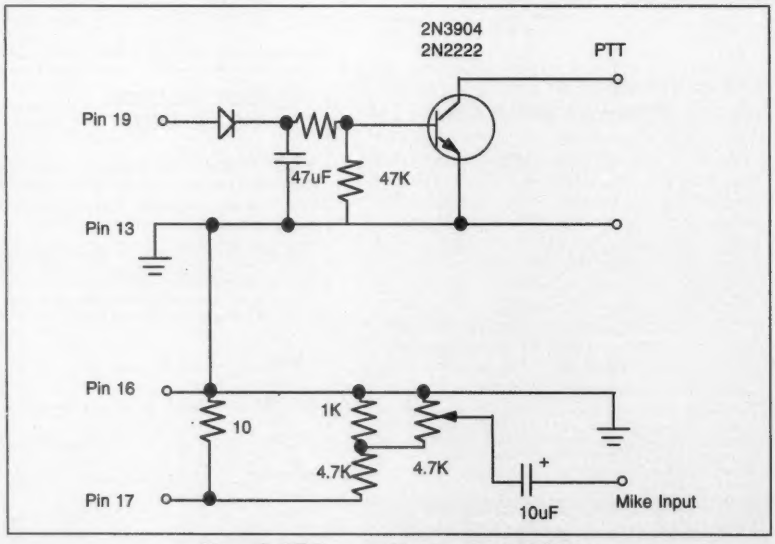


Figure 2. GE Progress Line repeater interface.

Travelin' Man's Dual-Band Antenna?

The extra reach could be of lifesaving importance in an emergency.

James H. Gray W1XU

During my years of traveling around the eastern United States on business or vacation, I often wished I had a small, inexpensive and easy-to-use antenna to match my little hand-held 2 meter radio. Occasionally I had an HF rig in the car, but more often it was the little 2 meter radio which was useful and fun. On long road trips it alleviated boredom, kept me awake and almost always assisted me in finding a motel, restaurant, or other ham's QTH. On such trips the mobile antenna was very satisfactory and I seldom needed any other antenna.

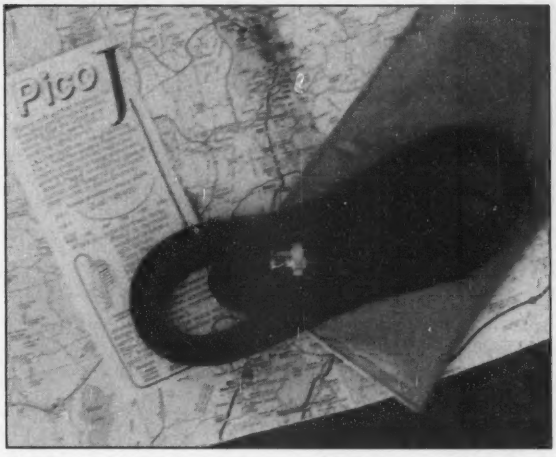
However, when I traveled by plane, the "rig" was the hand-held without a "brick" or amplifier to boost its output. Further, it had only a small telescoping whip that I could extend to about 19 inches. If I happened to be close enough to a repeater in a large city, that was fine and I managed to "work" the locals in spite of low power and a minimal antenna.

Nevertheless, there were occasions when there was no local repeater, or when I was inside a steel-and-concrete building. At such times I wasn't able to make any contacts at all and had to resort to the usual dull and tedious television programs before going to bed.

If you have faced similar problems when traveling "light" and by air, you know how it feels to be alone among the many. No doubt you have tried some of the same "fixes" I did; perhaps a small briefcase antenna or even a foil antenna put up to the window with some kind of sticky tape and a paper clip to fit into the BNC on the handheld—or other and stranger things. Inevitably, these were failures.

The Solution

Today, the travelin' man needn't worry; he has a ready solution to the problem—a neat antenna produced by Antennas West and called the Pico-J—an antenna which meets all of the requirements set forth in the first sentence of this article. Pico means "small," as in "pico-farad," and "J" is the rough configuration of this antenna. The J-pole is well known in the



literature and is usually made of tubing that can be mounted to a bracket on the side of a tower, a building, or mast. It has the advantage of a low-angle, omnidirectional and vertically polarized radiation pattern—just what's needed for 2 meters.

As you'll see, however, Antennas West's Pico-J offers some features not found in the well-known J-pole. For example, the feedpoint is already found and matched for you, and the antenna is small and light—so much so that it can be rolled up and stuffed in a small eyeglass case. Actually, it doesn't look like a "J" at all. The smaller "lip" portion is now made continuous with the upper radiating part extending the length to 55 inches from the top to the point where a six-foot length of small-diameter coaxial feedline is attached. The feedline is terminated with a goldpin BNC for direct attachment to your radio.

A small loop of heavy-duty fishline is attached to the top of the Pico-J, and this can be slipped over a curtain rod or a nail or any other suitable projection. But, if by chance you don't happen to find a suitable support, Antennas West thoughtfully provides a small suction cup with an embedded hook that can be slapped up on a window or any smooth surface. Then, all you need to do is slip the fishing loop onto the hook in the suction cup, and—presto!—you have your antenna support.

As Jim Stevens of Antennas West says: "It waits like a powerful genie in a bottle until you need a full-quieting signal." It is completely weater-sealed and could be hung outdoors if you wish. Otherwise, you can hang it in a closet or a doorway; in fact, anywhere that is convenient and where your signal won't be blocked. The extra reach provided by this beauty could be of lifesaving importance in an emergency and is always useful when just plain chatting with the locals.

Your Pico-J stretches range, improves reception, reaches far-away repeaters, and saves your battery pack.

The measured VWSR is less than 2:1 between 142 and 150 MHz—ideal for CAP and other services near the 2 meter band—and is less than 1.5:1 between 143 and 150 MHz, bottoming out at a very beautiful 1:1 at 146 MHz. Not bad, eh?

Best of all, considering the benefits, is the price: $19.95 for the 2 meter model, $26 for the dual band 2m/70cm model, which includes the soft vinyl case to store your Pico-J when it's not in use.

On a recent trip I tucked Pico-J into my briefcase right next to the handheld. No, I didn't even use the "duckie" or the telescoping whip because I had all I needed in this one neat antenna. Maybe you'll find the same.

—Condensed from ***Radio Fun***

*Now you can be full-quieting wherever you are. No visible antennas allowed? No one will see **Pico-J** hanging in your closet or on the balcony. But your signal will be heard. **Pico-J's** half-wave radiator is sleek and unobtrusive. Its thin flexible feedline is barely noticeable. **Pico-J** rolls up and slides into its pouch like the Genie slipping back into his bottle. Carry **Pico-J** on hikes or trips as you would carry a pair of glasses. Keep him in your emergency jumpkit. When you need gain and low-angle omnidirectional coverage, pull out **Pico-J** and be full-quieting when it counts.*

☐ **Yes, I want Pico-J to increase my range and save my battery pack. (2m=$19.95, 2m/70cm=$26)**

Name _____

Call _____ Phone _____

Street _____ Apt. ____

City _____ State____ Zip _____

Antennas West InfoPak $1 Order Hotline 800-926-7373

Box 50062S Provo, UT 84605

CIRCLE 74 ON READER SERVICE CARD

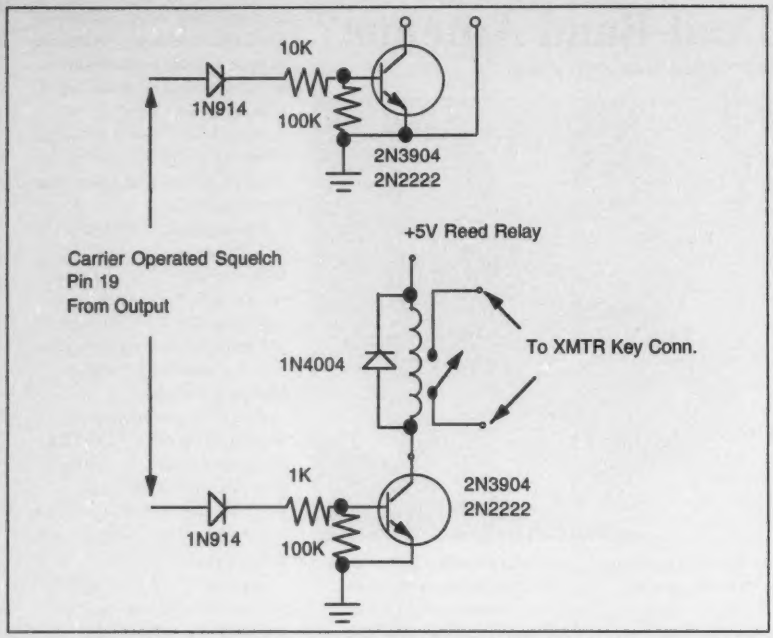


Figure 3. Transmitter keying schemes: a) Open-collector NPN switch, b) Alternate technique using a reed relay.

when many area coordinators will not assign repeaters without subaudible tone access, the Channel Guard option for these receivers is a valuable bonus. A new tone decoder board would certainly cost more than one of these receiver strips with Channel Guard and tone element. The Channel Guard operation (CTCSS or subaudible PL tone) can be enabled or defeated with a simple switch between output pin 18 and ground. Figure 2 shows a simple interface for directing the audio output into a transmitter. Even if a speaker monitor is not used, be sure to use 10 to 20 ohm resistor across the audio output leads to provide proper loading for the receiver audio amplifier. The input level to the transmitter is set by balancing both the receiver audio level and the 10k ohm input audio level control. If subaudible tone operation is not used, a tap for audio could be taken directly from the high side of the volume control, pin 5 on J443. This point, however, would be raw unsquelched audio, with any unfiltered subaudible tone present. A capacitor is used for audio coupling and DC isolation.

A carrier operated relay (COR) for keying a transmitter is also relatively simple. Pin 19 of the Progress Line receiver connector plug is a carrier operated squelch feed. This line outputs about 3 volts when a signal is received. An alternative method of keying the transmitter using the absence of voltage could also be employed. Pin 20 of the receiver, labled monitor lock, normally presents about 8 volts when the radio is squelched but the voltage on this pin falls to near zero when a signal is received, regardless of Channel Guard setting.

Two very simple keying techniques are shown in Figure 3. In the first case (Figure 3a) an NPN switching transistor is used with an open collector circuit for most transmitters which key by taking the PTT line to ground. The voltage from the radio forward biases the transistor causing the emitter to collector resistance path to fall very near zero and key the transmitter. In the other diagram (Figure 3b.) a similar circuit operates a relay which keys the transmitter. A slight delay or repeater tail could be achieved with an added resistor/capacitor network. Varying the component values

Parts List

1	7810 +10 volt regulator	Mouser Electronics part No. L78S10CV or equivalent
2	5k ohm trimpots	Mouser Electronics part No. 320-1510-5K or equivalent
Optional parts for repeater control and interface:		
10 ohm resistor for loading		Radio Shack
5k ohm trimpot		
1k resistor		
4.7k resistor		
1N914/4148 (or similar) diode		RS#276-1122
2.2 to 10 µF capacitor for audio coupling		
2N22[illegible]2A or 2N3904 for COS keying transistor		RS# 276-2009

Sources
Mouser Electronics
2401 Hwy 287 N.
Mansfield, Texas 76063—4827
1-800-346-6873

Crystal Manufacturers
(This is not a complete listing, just a representative sample of suppliers.)

Bowmar
201 Blackford Avenue
Middlesex, New Jersey 08846
1-800-777-2197

International Crystal Manufacturing Co., Inc.
P.O. Box 26330
Oklahoma City, Oklahoma 73126
1-800-725-1426

Jan Crystals
2341 Crystal Drive
P.O. Box 60017
Fort Myers, Florida 33906-6017
1-800-526-9825

Commercial Radio Vendors

(Thanks to Larry N5DH and Harvey WB5MCT for these hints.) (Again, this is not a complete listing, just a representative sample of dealers.)

VersaTel
1-800-456-5548

C. W. Wolfe Communications
1113 Central Avenue
Billings, Montana 59102
(406) 252-9220

BackPack Beam?
The little rig and 20 meter HalfSquare rode feather light in my pack as I followed the trail up into tall timber. With 3 hrs till dusk I made camp. Two tosses and HalfSquare was ready at 50 ft. I could hear to eternity—even the smallest signal sang clean above a silky silence. And miracle—by dawn my 2 watts were heard on every continent.
10 M $40 15 M $43 17 M $46 20 M $50 30 M $60 40 M $70 Add $6 P & H
InfoPak $1— Plans: TechNote 122—$7ppd USA
AntennasWest Order Hotline:
Box 50062-S, Provo UT 84605 801-373-8425
CIRCLE 368 ON READER SERVICE CARD

HamWindows
Your gateway to the world.
Software that combines the amateur radio with a personal computer.
HamWindows, Inc., 2121 E. Pacific Coast Hwy., Suite 120C
Corona del Mar, CA 92625
(714)729-4222 FAX (714)644-6277
CIRCLE 345 ON READER SERVICE CARD

GIVE YOUR
HR-2510 HR-2600
the same features as the
"BIG RIGS"
CHIPSWITCH
4773 Sonoma Hwy. Suite 132
Santa Rosa, CA 95409-4269
Write or call (707) 539-9512 for FREE information
CIRCLE 265 ON READER SERVICE CARD

CALL MCM
ELECTRONICS
FOR ALL YOUR
ELECTRONIC
PARTS NEEDS

1-800-543-4330

FAX 1-513-434-6959

MCM ELECTRONICS℠

A PREMIER Company

CALL MCM
ELECTRONICS
FOR ALL YOUR
ELECTRONIC
PARTS NEEDS

1-800-543-4330

FAX 1-513-434-6959

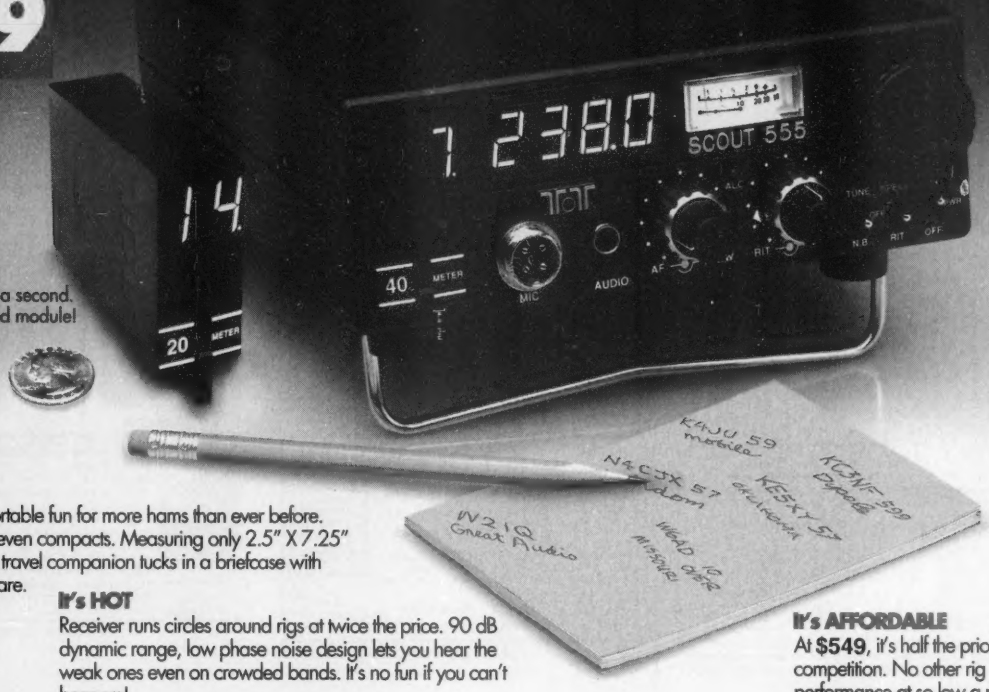
MCM ELECTRONICS℠

A PREMIER Company

SIMPLE, AFFORDABLE & FUN

DESIGNED FOR ONE REASON . . . TO HAVE FUN!
AND BOY DOES IT DELIVER!!!

$549



- Change bands in a second. Just plug in desired module!

It's SMALL
Makes mobile or portable fun for more hams than ever before. Fits almost any car, even compacts. Measuring only 2.5" X 7.25" X 9.75", this five lb. travel companion tucks in a briefcase with plenty of room to spare.

It's HOT
Receiver runs circles around rigs at twice the price. 90 dB dynamic range, low phase noise design lets you hear the weak ones even on crowded bands. It's no fun if you can't hear em!

It's SIMPLE
Just sit down and operate. Master every feature in minutes - no modern rig is as easy to use. Change band modules in a flash to work 160-10 meters including WARC.

It's AFFORDABLE
At **$549**, it's half the price of the closest competition. No other rig packs so much performance at so low a price. Have fun on HF without spending a fortune.

It's NOT A TOY
Crystal mixing (no synthesizer) coupled with meticulous circuit design yields sparkling clean receive audio. And you'll marvel at the unsolicited compliments on transmit audio.

MADE IN USA

- Patented "Jones" Filter provides variable bandwidth 9 pole crystal filter - 500 Hz to 2.5 kHz. The right filter for every condition at the touch of a knob.
- "SYNCHRO-LOCK" software keeps VFO virtually drift free regardless of temperature variations.
- Optional Noise Blanker
- SSB and CW 50 Watts Output Adjustable To 5 Watts
- Runs Off 12-14 VDC TX -10 Amps, RX -.6 Amps
- Receive Offset Tuning
- Built-in Iambic Keyer with Legendary QSK. Speed adjustable on front and shown in display.

$549 * Includes one band module of your choice

$29 * Each additional band module

SCOUT ACCESSORIES:

MODEL		PRICE*
296	Mobile Bracket	$15.00
297	Noise Blanker	$19.50
937	11 Amp Power Supply	$79.00
938	Tiny Switching Supply (Only 3 lbs.!)	$95.00
700C	Hand Mike	$39.95
607	Weighted Key Paddle	$39.00
291	Antenna Tuner	$89.00

VISA, MC, DISCOVER

*Plus shipping and handling; call toll-free for charges.

CALL 1-800-833-7373
Telephone Hours:
9:00 AM - 5:30 PM Eastern

...America's Best!
TEN-TEC

1185 Dolly Parton Parkway
Sevierville, TN 37862 USA
Office: (615) 453-7172
Fax: (615) 428-4483
Repair Dept.: (615) 428-0364

KITS ARE BACK!
Introducing TT Kits
A new division of Ten-Tec
Call 615-453-7172
to request your
kit catalog

Ordering GE Manuals & Parts

If you need a manual or parts for any GE manufactured radio and cannot get hold of one from local sources you can call:

For manuals: Ericsson GE Mobile Communications, Inc., Lynchburg, Virginia; (804) 528-7649.

The manuals are broken down into subparts, i.e. Exciter, PA board, Receiver, Audio-Squelch board, etc. Each subpart is generally $5. A full manual for a radio will run from $35 to $50, so try to find one locally, first! If all you need is one section, it is easy to just call Ericsson GE.

For parts: Ericsson GE Mobile Communications, Inc., Lynchburg, Virginia; (800) 368-3277.

changes the length of the tail. A light emitting diode (LED) could also be used as a visual indicator of a received and re-transmitted signal.

Extra Bonus for 9600 Packet Operators

These GE receiver strips make fine monitors of both 1200 baud and 9600 baud packet. For 9600 baud packet operation, the received signal can be taken from the discriminator output at pin 10 of the metering jack, J442. Usually they work just fine, but a slightly wider bandwidth can be achieved by soldering two short leads of wire across the crystal filter next to the output transformer under the IF-Audio & Squelch Board, and then twisting the ends together to form a capacitor to broaden the skirts of the filter. Having the capability of instantaneously monitoring your own signal and connecting to yourself on another packet stream for modem calibration and testing is a tremendous benefit, as anyone who operates packet knows.

Next time you need an inexpensive receiver or monitor, this vintage receiver may be just the ticket!

Tuneup Hints for the Poor Man

(Thanks to Larry N5DH and Harvey WB5MCT for these hints.)

Since the tuning range of the GE receiver strips is relatively narrow, any change of operating frequency of more than one or two megahertz will require retuning the receiver front end. Not everyone has a complete test bench with a wide range frequency generator at their disposal, but most hams have all the gear needed to retune receivers. Modern synthesized radios, either handheld or mobile, are very accurate frequency generators. The problem is generally that the radios still put out too much power even on lowest power settings. Using a 50' or longer length of coaxial cable makes a great signal attenuator. Rubber duckie antennas, dummy loads, or other less efficient radiators also help reduce generated signals down to acceptable levels for retuning radios. Another trick for tuning radios is to use a scanner for a signal generator. Check the scanner specifications for the IF frequency, usually about 10.7 MHz above or below the intended frequency. Often, tuning the scanner to this IF frequency above or below the intended frequency will generate an RF frequency which can be used as a signal for tuning the receiver.

The strength of the signal can be increased or decreased by moving the scanner nearer or father away from the receiver. The basic idea is to tune the sections of the radio using an unmodulated carrier until the maximum selectivity or radio opened squelch quieting (least noise) is obtained. As the receiver comes into tune, loosely coupling the antennas of the scanner (or signal generator) and the receiver will also attenuate the signal to the receiver until maximum quieting in the receiver is achieved. In some instances, as the receiver comes into tune it may be necessary to slightly detune an early stage of the receiver to determine the maximum tuning or selectivity of later stages.

J442 Metering Jack Test

pin#	Function
1	
2	2nd IF
3	1st Limiter
4	Multiplier 1
5	Multiplier 2
6	
7	Audio output #1
8	System Negative
9	
10	Discriminator
11	
12	
13	Regulated +10 volts
14	
15	Audio output #2
16	Ground

TNT FIELD DAY ANTENNA
complete, assembled/ready to use.
No pruning, TNT is No-tune on 80 cw, 40, 20, 17, 12, 10. TNT/2 is No-tune on 40, 20, 10. Work other bands w/ tuner. DX & Gain rise w/ frequency.
No tuning, Kink-proof Wx-Sealed Low Noise
No knobs to twist. No Traps or Resistors Insulated to 3000 V Rated 500 Watts
Ready to Use Includes isolation balun & 99 ft RG8x
The modern coax-fed version of the classic off-center fed window. Thickness 12ga—#6.95 ppd
TNT Windom $89.95 + $8 P&H 135ft. long
TNT/2 Windom $79.95 + $7 P&H 67 ft. long
Antennas West
Box 50062S, Provo, UT 84605
Order Hotline 801-373-8425
CIRCLE 135 ON READER SERVICE CARD

ULTIMATE MODIFICATION BIBLE VOL. IV
NEW AND MORE COMPLETE!!!
OVER 800 MIKE WIRING CODES FOR CB AND HAM RADIOS.
OVER 400 CB POWER/MODULATION BOOST INSTRUCTIONS.
OVER 200 MOD. FOR CB PLL'S.
OVER 175 MOD. FOR HAM RADIOS.
OVER 50 COMPLETE SYNTHESIZED CRYSTAL CHARTS WITH INSTRUCTIONS.
OVER 25 SCANNER MOD. AND TEN METER RADIO MOD.
OVER 20 PRE-CALCULATED MOD. CRYSTAL CHARTS.
LINER SCHEMATIC'S AND ANT./COAX db GAIN/LOSS CHARTS.
KDC SOUND
17294 FM 3083
Conroe, TX 77302
Orders Only: 1-800-256-9895
All Other Calls: 409-231-3753
$29.95
MONEY ORDER, COD
MC/DISC./VISA OR CK
CIRCLE 151 ON READER SERVICE CARD

Quality Microwave TV Antennas
WIRELESS CABLE - IFTS - MMDS - Amateur TV
Ultra High Gain 50db(+) • Tuneable 1.9 to 2.7 Ghz.
• 55-Channel Dish System $199.95
• 36-Channel Dish System $149.95
• 20-Channel Dish System $124.95
• Optional Commercial Grid Antenna (not shown) Add $50.00
• Yagi Antennas, Components, Custom Tuning Available
• Call or write (SASE) for "FREE" Catalog
PHILLIPS-TECH ELECTRONICS
P.O. Box 8533 • Scottsdale, AZ 85252
(602) 947-7700 ($3.00 Credit all phone orders)
MasterCard • Visa • American Express • COD's • Quantity Pricing
Dish System
LIFETIME WARRANTY
CIRCLE 249 ON READER SERVICE CARD

PCRC PERSONAL COMPUTER REPEATER CONTROLLER
Speaks for Itself
✓Full Duplex Autopatch
✓911 Emergency Access
✓Reverse Autopatch ✓Toll Restriction
✓Voice Mail ✓Voice ID's ✓BSR X10
✓Voice/Tone/DTMF Paging ✓Scheduler
✓Links ✓Programmable Courtesy Tones
✓Hardware Logic I/O ✓HF Remote Control
✓Morse Code Practice ✓Remote Base
PCRC/2 Combines the power of your XT/AT platform with a high quality play and record voice digitizer creating the ultimate repeater controller.
from $695
516-563-4715
Fax:563-4716 BBS: 286-1518
CIRCLE 198 ON READER SERVICE CARD

Now for Windows!
LOGic 4
HAM RADIO SOFTWARE
The ultimate in ham radio software! Complete logging, online awards tracking, QSL management facility, radio interfacing, antenna rotor control, data terminal for all digital modes, unequaled packet spotting, contesting, CW keyer, sound card support, full mouse support, customizable screens and reports, superb documentation and tech support, grayline propagation chart, interface to callbook databases, and much more. Specs: IBM 386SX, 4mb RAM, hard drive. LOGic 4 DOS $79, Windows $99. LOGic Jr DOS $39, Windows $49. Foreign shipping extra. visa/mc. Free infopak! Also available: PDA QSL Route List. Radio interface hardware. Keyer interface hardware.
Personal Database Applications, Dept 7, 2616 Meadow Ridge Dr., Duluth, GA 30136. Ph. 404-242-0887. Fax 404-449-6687 Tech supp. 404-417-1899. 8-6 M-Th, 8-noon Fri.
Windows or DOS!

ONV SAFETY BELT CO.
P.O. Box 404 • Ramsey, NJ 07446
800-345-5634
Phone & FAX 201-327-2462
ONV Safety Belt With Seat Harness
$89.95
OSHA
We Ship Worldwide
Order Desk Open 7 Days/Week
ONV Tool Pouch $15.95
Add $4.00 For Handling VISA M/C CHECK
ONV Belt W/O Seat Harness
$74.95
CIRCLE 102 ON READER SERVICE CARD

MFJ Dual Band Mobile Antenna

For an incredible $14.95, you get a dual band 2 Meter/440 MHz mobile antenna with strong magnet mount, stainless steel radiator, 15 feet of coax and BNC adapter for your handheld -- It's the fastest selling mobile antenna in ham radio!

MFJ-1724B **$14.95** **For** an incredibly low $14.95, you get an MFJ dual band 2 Meter /440 MHz mobile antenna!

It's the fastest selling mobile antenna in ham radio!

You get excellent gain for solid, noise-free QSOs. On 440 MHz, it's a high gain ½ wave over ¼ wave radiator. On 2 Meters, it's a *full size* ¼ wave radiator.

Its tough *stainless steel* radiator is only 19 inches tall -- won't knock off when parking in your garage.

An extra powerful magnet holds it steady -- even at highway speeds.

You get 15 feet of coax with a standard PL-259 coax connector for your mobile rig.

You get a BNC adapter so you can also use it with your handheld!

Your MFJ-1724B is protected by MFJ's famous one year *No Matter What*™ unconditional guarantee.

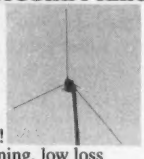
DualBand 144/440 MHz Ground Plane

MFJ-1754 **$24.95** *New!*

Dual band ground plane antenna for 2 Meters and 440 MHz gives you extra long range on 440 MHz with a high gain halfwave over quarter wave radiator. On 2 Meters you get solid quarter wave performance. Mounts on 1 to 1½ inch mast with single U-bolt. Easy-to-tune.

1/4 Wave Ground Plane

MFJ-1740 **$12.95**



The MFJ-1740 brings up 2 Meter repeaters as well as any ¼ wave ground plane made!

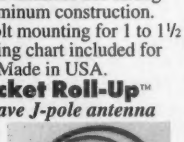
You get easy tuning, low loss ceramic antenna insulator and strong lightweight aluminum construction.

Single U-bolt mounting for 1 to 1½ inch mast. Cutting chart included for 220/440 MHz. Made in USA.

MFJ Pocket Roll-Up™

2 Meter halfwave J-pole antenna

MFJ-1730 **$14.95**



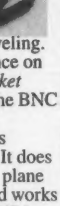
Roll up this *halfwave* 2M J-pole antenna and stick it in your pocket! It's the perfect *gain* antenna for traveling.

Get home station performance on the go. Just hang your *MFJ Pocket Roll-Up*™ in the clear and plug the BNC connector into your handheld.

It's omni-directional and has significant gain over a ¼ wave. It does not need a cumbersome ground plane so it's convenient for indoors and works great with handhelds. Made in USA

Dual Band *flexible* Ducks

144/440 MHz flexible ducks for HTs



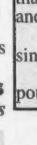
A. *High Gain FlexiDuck*™, **MFJ-1717, $19.95.** Enjoy dependable QSOs when other rubber ducks give you noise. High gain ½ wave on 440 MHz, full size ¼ wave on 2M. Won't jab you -- bends, twists, flexes with you. 15¾ inches.

B. *FlexiDuck*™, **MFJ-1716,** A. B. **$16.95.** Similar to MFJ-1717. Full ¼ wave on 440 MHz, efficient loaded ¼ wave on 2 Meters. 8¾ inches.

Shorty Duck™ for HTs

Add this *short*, 4¼ inch *ShortyDuck*™ to your 2M handheld for a Q-5 signal! Impedance matched for maximum gain. High-Q helical wound radiator.

MFJ-1718 **$12.95**



5/8 Wave 2 Meter Mobile Antenna

MFJ-1728/B **$24.95** **For** *maximum range* while mobile, use MFJ's *Maximum Gain*™ 5/8 Wave 2 Meter Mobile Antenna. You'll get the maximum possible gain of any single element mobile antenna!

Competitive 5/8 wave mobile antennas can't work any better -- no matter how much more they cost.

You get low SWR so your rig can safely deliver maximum power into your antenna. It's rated at 300 watts PEP so you can use any mobile rig plus a mobile amplifier.

You get a heavy-duty magnet mount that holds your antenna tight at highway speeds and a black magnet base that'll look good for years.

You get a stainless steel radiator that'll endure years of harsh mobile use and 12 feet of coax cable.

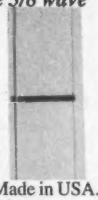
You get MFJ's one year *No Matter What*™ unconditional guarantee.

Order MFJ-1728 with standard PL-259 coax connector or MFJ-1728B that also includes a BNC adapter for your handheld.

Stacked 5/8 Wave for 2 Meters

gives twice the omni-directional gain of a single 5/8 wave

MFJ-1764 **$34.95**



MFJ's stacked 5/8 wave radiators give you *more than twice* the *omni-directional* gain of a single 5/8 wave radiator!

Wide 10 MHz 2:1 SWR bandwidth . . . excellent ferrite choke balun feedline decoupling . . . shunt choke for bleeding off unwanted static . . . strong lightweight aluminum.

Fully assembled -- simply attach radiators -- no tuning required. Mounts vertically for FM/Packet or horizontally for SSB. Installs with single U-bolt on 1 to 1½ inch mast or tower leg. 1½ lbs., two 47 inch radiators, 23 inch boom. Made in USA.

Also works as excellent *6 Meter* full halfwave centerfed antenna.

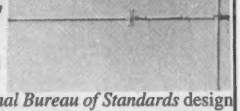
MFJ-1766, $89.95, gives you *four times* the gain of single 5/8 wave. Includes 2 MFJ-1764, phasing cables. Doubles gain on 6 Meters.

MFJ-1765, $29.95, phasing cables for 2 MFJ-1764s, other 2M ant.

MFJ *dual band* 144/440 MHz Yagi

5 elements on 440 MHz . . . 4 elements on 2 Meters . . .$49.95

MFJ-1768 **$49.95** *New!*



Get two Yagis for the price of one . . . enjoy two Yagis in the space of one with single coax feed!

MFJ's *exclusive* dual band balanced feed with *FerriteChoke*™ decoupling prevents pattern skewing and gives you low SWR.

The MFJ-1768 is based on the *National Bureau of Standards* design that's optimized for maximum forward gain with high front-to-back ratio and a clean symmetrical pattern.

Mounts vertically for FM/Packet or horizontally for SSB with single included U-bolt on 1 to 1½ inch mast or tower leg.

High strength 6061-T6 aluminum 5 foot, 1⅛ inch diameter boom. 2 pounds. Elements are electrically isolated from boom. Made in USA.

Portable 3 element Yagi for 2 M

MFJ-1763 **$39.95**

You can set up or take down MFJ's *portable* 3 elements 2 Meter Yagi in seconds! Elements simply screw into the boom.

You can take it with you wherever you go and have the "oomph" and directivity of a beam.

It's easy to store and sturdy enough to use as your home station antenna.

Mounts vertically for FM/packet or horizontally for SSB. *Center* or *end* mounts with single U-bolt. Great for packet/PacketCluster™.

It's compact 2¾ foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.

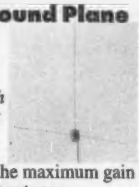
Extra thick elements maintain high gain and directivity over entire 2 Meter band. MFJ's *FerriteChoke*™ decouples feedline.

Elements and boom are made from strong lightweight aluminum and protected by MFJ's *Permanent Molecular Bonding Technology*™.

Weighs just 2 pounds. Boom is 30½ inches. Made in USA.

5/8 Wave Ground Plane

MFJ-1750 **$19.95**



For a low, low $19.95, you get a *high performance* 2 Meter 5/8 wave ground plane home station antenna -- you'll get the maximum gain of any single element antenna.

More expensive 5/8 wave ground planes can't work any better -- no matter how much they cost.

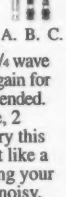
You get . . . shunt fed matching that bleeds off unwanted static and gives you low SWR . . . strong lightweight aluminum construction . . . low loss ceramic antenna insulator . . . MFJ's *RapidTune*™ radiator . . . MFJ's one year *No Matter What*™ guarantee. It mounts on 1 to 1½ inch mast with single U-bolt and is Made in USA.

MFJ-1752, $19.95, for 220 MHz .

HT Range Extenders

Telescoping antennas for handhelds

A. *Long Ranger*™ 2 Meter Halfwave, **MFJ-1714,** $16.95. For really long range this MFJ endfed halfwave is hard to beat. It outperforms a ⅝ wave on a handheld because the ⅝ wave needs a ground plane. The MFJ halfwave doesn't. It's shorter, lighter, has more gain and places less stress on your antenna connector than a ⅝ wave antenna. When collapsed, it performs like a rubber duck. 40" extended, 10½" collapsed.



A. B. C.

B. *Dual Bander*™ for 2 Meters and 440 MHz, **MFJ-1712,** $14.95. Got a new dual band handheld or separate units? One antenna fits all. It's a ¼ wave for 2 Meters and a ⅝ wave with gain for 440 MHz. 7¼" collapsed, 19" extended.

C. *Pocket Linear*™ ⅜ Wave, 2 Meters, **MFJ-1710,** $9.95. Carry this pen size antenna in your pocket like a ballpoint pen. When you're using your rubber duck, on the fringe and noisy, put on the *Pocket Linear*™, extend it to 24½" and carry on your QSO. Has pocket clip. 5¼" collapsed.

144/440 MHz Duplexer

MFJ-916 **$29.95**

Lets you use dual band 144/440 MHz antenna with separate transceivers *or* separate 144/440 MHz antennas with dual band transceiver.

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)

• 1 year *unconditional* guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • *Free* catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri.
FAX: (601) 323-6551; **Add s/h**

MFJ . . . making quality affordable

Prices and specifications subject to change © 1994 MFJ Enterprises, Inc.

PTT Control from Receiver Audio

Here's an easy way to key a transmitter for remote or repeater operation.

by Roland Burgan KB8XI

Does this scenario sound familiar? You needed to key a transmitter when a signal came into your receiver, but there was no way you were going to risk voiding the warranty on your new radio. That very problem has canceled many a project.

Years ago, accessing the COS line (carrier-operated squelch) was fairly easy, allowing simple control of transmitters for repeaters, base extenders, etc. However, recent advances in technology have produced radios that make such tap-offs very difficult, even for the experienced ham. And the possibility of voiding a warranty is no longer something to scoff at.

I needed a way to key a transmitter upon receiving a signal, without invading the insides of my transceiver. Adding a permanent dangling wire was not appealing, and adding another jack was appalling. There are circuits that provide a signal from an audio source, but they all seem to need voice audio to develop a keying signal (VOX). But now there is a reliable alternative.

Various Uses

This circuit will be especially useful for putting together base/mobile/portable repeaters or remote operations. It will allow the use of equipment without your having to get inside and do circuit surgery. Also, this circuit will provide a switching signal for various devices or secondary units which need to operate when a signal (with or without audio) is received.

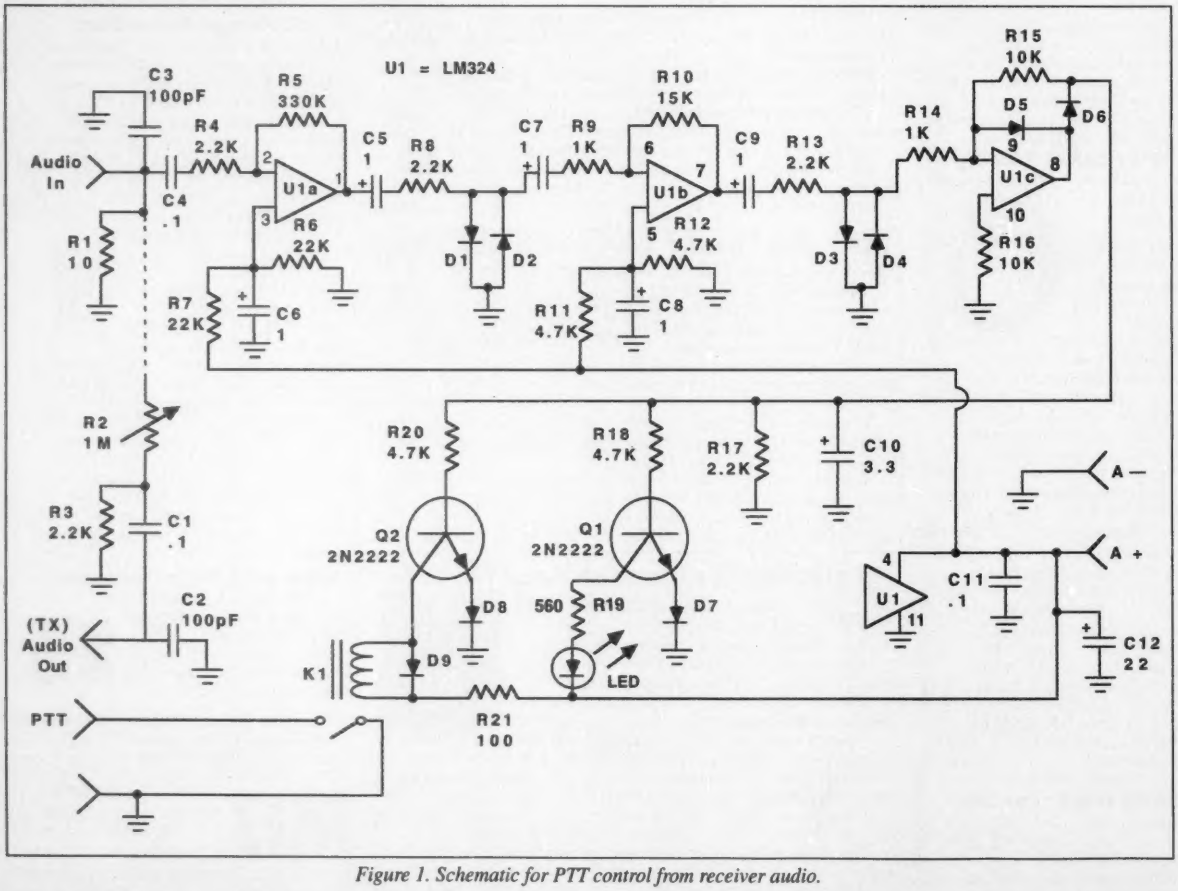


Figure 1. Schematic for PTT control from receiver audio.

Circuit Analysis

The circuit functions on the noise level difference between a full-squelched audio output and the audio noise level present when the squelch opens upon receiving an unmodulated signal. Measurements showed that, on average, there is about a 20 dB difference in levels, and the circuit uses this difference to recreate the COS signal voltage. Op amp U1a (Figure 1) amplifies the audio input, which is then clipped to 0.6V in the first of two clippers. Op amp U1b amplifies the resulting signal, which clips it a second time to 0.6 volts. The result of U1a & U1b is to highly compress and clip the incoming audio noise signal. This signal goes to U1c, which serves in a dual capacity. This op amp first functions as a precision rectifier, producing a DC voltage, and secondly acts as a DC amplifier, raising the DC signal to a TTL level. The TTL level signal voltage then feeds two NPN transistors, one controlling an LED to show status, and the other operating a 5-volt reed relay. A relay was chosen instead of electronic switching to provide reliable device control, especially in repeater/remote base applications. C10 acts as a smoothing filter for the DC signal. The slight time delay this also provides is negligible. Diodes D7 and D8 in the base circuits of the switching transistors will act to prevent false triggering. The LM-324 IC requires only a single supply of from 6 to 18 volts. The audio and A+ line are RF-bypassed. The total circuit gain is 22,500.

Audio Option

For convenience, I have included a transmit audio feed as an option. The variable resister, R2, allows the user to set the receiver volume control to some easily remembered preset point. Then adjust R2 for the required transmit 5 kHz maximum deviation. The 100 pF capacitor acts as RF bypass, while R3 sets level and impedance matching. If your transmitter is designed for high impedance mikes, then delete R3.

Construction

A printed circuit board for this circuit is available for $4.00 plus $1.50 S&H per order from FAR Circuits, 18N640 Field Court, Dundee, IL 60118. Construction may be either on a PCB or point-to-point—there is nothing critical to watch out for. An input sensitivity control was unnecessary because of the heavy signal clipping. However, if your audio source puts out more than 0.5 watt, change the power rating of R1 accordingly. If you intend use this with a transmitter, RF protection requires a metal case. If it becomes necessary to use a higher power supply voltage, changing the relay current limiting resistor (R21) from 100 to 220 ohms and changing the LED resister (R19) to 2.2k will allow operation from 16 to 30 volts (max) power sources. Low current requirements also allow the use of a 9-volt battery. All parts are available from Radio Shack and many other suppliers.

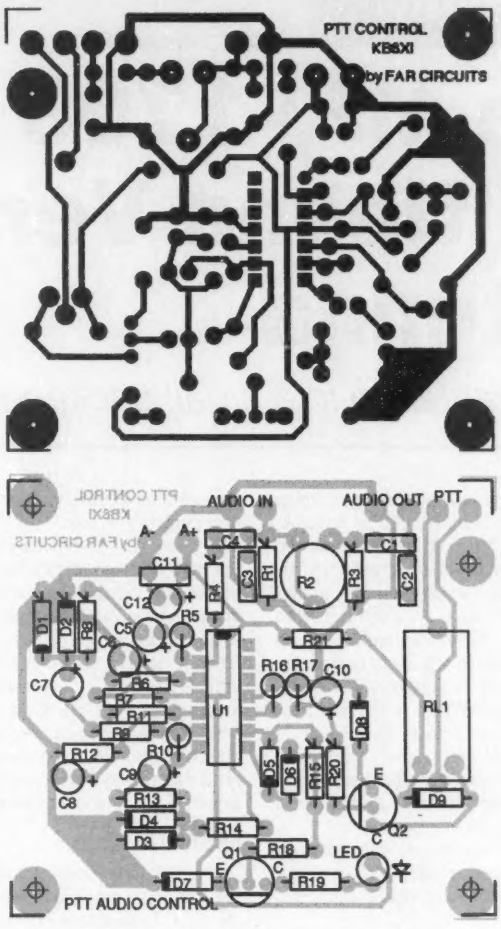


Figure 2. PC board etch pattern and parts placement.

Parts List

C1, C4, C11	0.1 µF, 50V	R/S #272-109
C2, C3	100 pF, 50V	R/S #272-123
C5, C6, C7, C8, C9	1 µF, 35V	R/S #272-1434
C10	3.3 µF, 35V	R/S #272-802
C12	22 µF, 35V	R/S #272-1026
R1	10, 1/2W	R/S #271-001
R2	1 meg. pot, 1/2W	R/S #271-211
R3, R4, R8, R13, R17	2.2k, 1/4W	R/S #271-1325
R5	330k, 1/4W	*R/S #271-1350, 271-1347
R6, R7	22k, 1/4W	R/S #271-1339
R9, R14	1k, 1/4W	R/S #271-1321
R10	15k, 1/4W	R/S #271-1337
R11, R12, R18, R20	4.7k, 1/4W	R/S #271-1330
R15, R16	10k, 1/4W	R/S #271-1335
R19	560, 1/2W	R/S #271-020
R21	100, 1/4W	R/S #271-1311
U1	LM324	R/S #276-1711
Q1, Q2	2N2222	R/S #276-2009
D1-D9	4001 diodes	R/S #276-1653
K1	5 VDC reed relay	R/S #275-232
LED	Any 2V LED	

*Note: Unfortunately, Radio Shack no longer supplies 330k resistors. Wire a 100k and 220k in series.

73 Review

Number 8 on your Feedback card

by Don Johnson K7UGQ

MFJ Enterprises, Inc.
P.O. Box 494
Mississippi State MS 39762
Telephone: (601) 323-5869
Orders: (800) 647-1800
Fax: (601) 323-6551
Price Class: $199.95

The MFJ-1796 Multiband Vertical Antenna

A lot of antenna in a small package.

Vertical antennas have the dubious reputation of being either loved or hated by members of the ham radio community. In simple terms, if the antenna is properly designed and installed, the vertical will provide creditable performance and, in certain instances, will out-perform a flat-topped horizontal wire. Because of its natural low angle of radiation, a vertical can haul in the DX better than a comparable horizontal flat-top antenna. However, for short, local contacts, its low angle of radiation coupled with "cross polarization" (theoretical 90-degree shift from horizontal to vertical), will perform somewhat less than a horizontal wire antenna.

Failure of vertical antennas to perform well is often attributed to two basic problems: poor multiband design and inadequate radial systems.

MFJ has introduced a family of autoband switching multiband vertical antennas that addresses both issues. Eliminating the need for radials through a design that electrically mimics a half-wave antenna and reducing losses common with end-fed trap verticals, the engineers have addressed issues responsible for most amateurs' poor experience when using vertical antennas.

Vertical Basics

A basic 40 meter quarter-wave vertical antenna is approximately 33 feet tall and requires a very good ground or counterpoise system to perform properly. In fact, the absence of a well-designed ground system is most often the reason horror stories circulate during vertical antenna discussions. The ground system must be electrically the same as the quarter-wave vertical section, on all operating frequencies, if any system efficiency is expected. Most ham urban/suburban homes do not have enough land, free of obstacles, to connect the several hundred feet of buried or elevated wire necessary for a good RF ground or counterpoise. An acceptable way to overcome the requirement for a cumbersome ground/counterpoise system is to center feed the antenna. However, a basic 40 meter center-fed vertical will stand prohibitively tall at approximately 66 feet.

A vertical can be short and still resonate at the designed frequencies by placing matching devices (loading coils and capacity hats) in each of the vertical elements. The location of a matching device can be at the feed point (bottom loading), in the middle (center loading), or at the end (end loading). While end loading is by far the most efficient of the three, it is also the most demanding for good physical design. A poorly-designed end-loaded antenna will surely self-destruct (cantilever) during a moderate windstorm.

Electrical Design

The MFJ-1796 is a center-fed or balanced-fed electrical half-wave vertical. In other words, a dipole antenna turned 90 degrees to the vertical. As a result, both half waves of the radiated signal are accounted for. At an overall length of 12 feet, loading coils and capacity hats for each band (40-20-15-10) are placed at the ends of each vertical component. This technique provides an electrical half-wave match while maintaining a small unobtrusive overall height. The antenna provides 6 and 2 meter performance through full-sized half-wave elements.

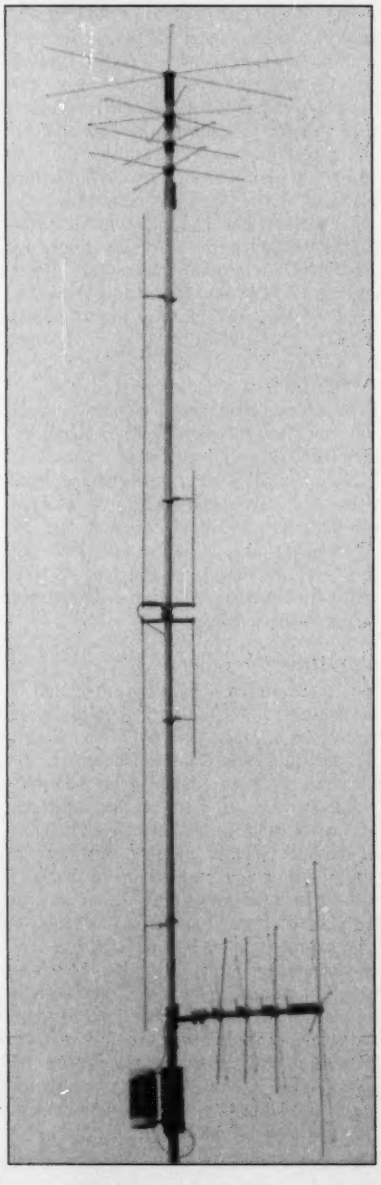
On the four HF bands, the antenna is designed to handle up to 1,500 watts of power, 750 watts on 6 and 300 watts on 2.

Physical Design

As discussed earlier, an antenna with end loading requires a very good physical design. Engineers at MFJ designed the 1796 with 1.16" diameter 6061-T6 aluminum tubing. The critical center and base insulators are made of reinforced Fiberglas, 1" in diameter. All coil forms are also made of Fiberglas.

A four-inch air-wound current balun mounted at the base of the antenna chokes off unwanted RF on the coax cable shield.

Various lengths of aluminum rods are used for capacity hats. Installation of the rods couldn't be made any easier. Once installed, they can be pruned or bent to fine-tune the different resonance points of the antenna.



Though somewhat fragile, the design of the capacity hat rods affords a substantial amount of ductility. The rods will not break under normal use. If accidentally hit during installation, they will deflect or bend. Real physical abuse is needed to break them.

Assembly

The 14-page manual offers step-by-step assembly instructions with several very clear drawings. Additionally, the manual discusses vertical antenna theory and offers hints for choosing a location for the antenna and tuning instructions. I strongly recommend that you follow the assembly manual exactly as written, especially the step that suggests that a temporary mounting or staging area be assembled before constructing the antenna. Once assembly begins, you will need a place to rest the antenna.

As with all MFJ equipment, the warranty explicitly states that the owner is authorized to attempt to repair any defective condition without affecting warranty coverage. A toll-free telephone number is provided for assembly or installation support if required.

Tuning

Nothing is more discouraging and frustrating than to assemble an antenna, perform frequency adjustment, and raise the antenna to height only to have to lower it for additional adjustments. The 1796 is designed to minimize this installation cycle.

As can be expected with a physically short antenna, the lower frequency resonance bandwidths are narrower and more sensitive to adjust than the higher ones. Range of operation (2:1 SWR points) on 40 meters is 40 kHz wide. Before any frequency adjustment is made, you should decide on what segments of the various bands you intend to operate in: CW, phone or somewhere in between.

If assembled per the instruction manual, the resonant frequency for each band will occur at or just below the lowest frequency for each band. For example, 20 meters should be resonant at approximately 13.9 MHz. To increase the operating frequency to the desired segment of the band, you must trim one spoke in each coil assembly. A chart is provided describing the effect of cutting one inch off of the spoke. If I wanted to raise the 20 meter resonant frequency from the assembled 13.9 MHz to 14.2 MHz, the chart says to cut three inches off of one of the 20 meter capacity hat spokes. Since this is a balanced vertical dipole, both sides of the antenna must be adjusted at the same time. I was able to hit my desired frequency, on all bands, the first time!

Extra spokes are provided in case you make you an error when cutting or should you decide to lower the initial frequency.

Comparisons

Antenna comparisons can be like comparing apples and oranges; they are both fruit, but are really different in many other ways. However, comparisons help make decisions, so here goes.

The MFJ-1796 works! How well it works depends upon several factors. Remember, the 1796 is not a multi-element beam, nor should one expect results to be comparable to a beam in any way. When installed 35 feet up and compared to a full-size 80 meter dipole (30 feet up) and a horizontally-mounted magnetic loop (35 feet up), comparable results were obtained . . . sometimes!

Because of two basic antenna facts, low angle of radiation and phase shift, the 1796 does not perform on local contacts as well as the magnetic loop or the dipole. However, if the local station is using a vertically-mounted antenna (same polarization), then the 1796 outperforms both of the other antennas. Because of the inherited low angle of radiation you should expect the 1796 to give a very good account of itself on long-haul DX. And it does. Stations 3,000 miles or so away were heard and worked when the dipole couldn't copy them at all.

The 1796 is a noisier antenna than either the dipole or the loop. In fact, if an electrical storm is within several hundred miles, you may not hear much of anything. This is not the fault of the 1796 but a typical characteristic of all verticals.

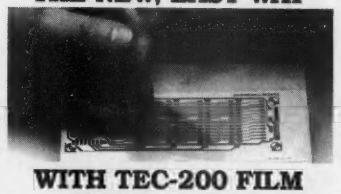
Several other things to consider when comparing antennas to the MFJ-1796 are: the small footprint (2 square feet), no radials, only 12 feet tall, lightweight, sound construction, and broad frequency coverage (40 meters through 2 meters).

Closing Comments

Remembering that the MFJ-1796 is a short (compromise) antenna, overall performance is less than a full-size antenna. Therefore, if you can install a full-size antenna, the 1796 is not your best choice. The engineers at MFJ have given serious thought in the areas of antenna design that increase efficiency in an effort to overcome the shortcomings of this type of antenna. If you are on a limited budget and/or must contend with restricted installation space, I strongly recommend the MFJ-1796.

Sell your products in 73 Amateur Radio Today! Call Dan Harper at (800) 274-7373.

MAKE CIRCUIT BOARDS THE NEW, EASY WAY



WITH TEC-200 FILM

JUST 3 EASY STEPS:

- Copy circuit pattern on TEC-200 film using any plain paper copier
- Iron film on to copper clad board
- Peel off film and etch

convenient 8 1/2 x 11 size
With Complete Instructions
SATISFACTION GUARANTEED
5 Sheets for **$4.95** 10 Sheets only **$6.95**
add $1.50 postage

The MEADOWLAKE Corp.
Dept. A P.O. Box 1555
Oneco, FL 34264

Use Your
Reader Service Card Today!
Our Advertisers
Want To Hear From You!

MORSE CODE MUSIC!

SENSATIONAL NEW WAY TO LEARN CODE—Do Aerobics, Sing, Jog, or Drive while learning code! A fun & easy way to learn or retain Morse Code skills. Now the secret is yours with this amazing syncronized breakthrough! Great fun tape for all licenses and classrooms! Order:

"THE RHYTHM OF THE CODE"
Version 2 cassette today!
Send $9.95 and include $2.00 S/H to:

KAWA RECORDS
P.O. Box 319-ST
Weymouth, MA 02188
Check or money order only. We ship all orders within 5 days.
MA residents add 5% sales tax.

CIRCLE 2 ON READER SERVICE CARD

Slow Scan TV

doesn't have to be expensive anymore!

Every day more hams are enhancing their communication by using images. Join the fun and *see* what you've been missing.

Quality Color SSTV is easy and affordable with ***Pasokon TV.*** $239.95

Requires IBM PC-compatible, '386 or better CPU, 1 Megabyte of memory, color VGA display, MS-DOS. Shipping: $5 to U.S.A. and Canada, $15 for others. Write or call for complete details.

Absolute Value Systems
115 Stedman St. # 7
Chelmsford, MA 01824-1823
(508) 256 6907
e-mail: johnl@world.std.com

CIRCLE 351 ON READER SERVICE CARD

The 80/40/30m Tripole

It's a WHAT?

by Dave Brown W9CGI

No, I did not grow a third element off of a dipole just for fun, nor did I name this project just to confuse you. Friends dubbed it the "TRI-DI-POLE." That may be more accurate, but was just too much of a mouthful for me to use as a title. The "TRI" simply reflects the fact that this is three antennas. The "DI" meant that all those antennas are DIpoles. Last, the POLE just refers to the elements used in an antenna—and this one actually has six "poles."

My need for a low-band HF antenna came about when I at last received my Advanced license, after 30+ years a happy-camper Technician Class ham. I really did not study for three decades, it just took that long for me to care enough to give it a try. I got around the 20m-and-up bands I had gained by a simple multiband vertical requiring no radials. The challenge came in trying to fit 80/40/30m into my life. I do live on a farm, but even I don't have unlimited space, much less want the hassle of maintaining three separate feedlines, supports, and so on. While I was researching every "wire" antenna handbook I own or could lay hands on, I came across the very old idea of "cage" antennas. These are usually multi-element, but for only one band. That is, much like folded dipoles are used to raise input impedances, and not to get more bands covered. What if I were to build the simple 80m dipole to cover that band, and then in somewhat that cage manner mentioned, add the 40m elements and check all that out? Last, I could add the 30m sections and then be sure the other two bands still worked. My first try at that, I left "extra" at the ends of the dipoles to be sure—it is a trim-to-fit world we live in. You should not have to do that if you stay with the wire sizes and spacings given here, though leaving a bit over and trimming is always best if you want to be "right on"!

Not only did each other add-on band fit right in without disturbing the bands put together ahead of it, but there was also an added bonus! About a week after getting the 80/40/30m portions all up and going, I was thinking, "Now, what the heck do I do about 160m?" After all, a newly-licensed HF ham is out to try all the new real estate he can cover, as soon as he can cover it. I figured that if I used low power and tried the new tripole, I had nothing to lose. I have a Yaesu FT-990 with the built-in tuner, so some might say I could load a good salami if necessary. That was the case at first. The tuner was indeed used, *and* I stayed down around 10 to 15 watts. The funny part was that when I first tried it, the tuner light came on and went off almost instantly. That led me to think, "OH-OH, this may not be such a good idea!" It was not until I had some time a week later to further investigate that the tuner had shut off because the antenna was a good match, not because of high SWR or any such thing. Cautiously, I tried it with more and more power up to the 100 watts or so output of the FT990, and on tuneup it did just fine. Then the acid test: back to low power, meter in SWR position, and switch the tuner off. Still, the antenna loaded just fine on 160m with no tuner at all. With the

	CHW (feet)	CQW (feet)	CQW (ft. & in.)	SL (ft. & in.)	TL (in.)	FT (in.)
80m	121.875	60.9375	60' 11-1/4"	60' 6"	18"	17.5"
40m	65.455	32.727	32' 8-3/4"	32' 2"	15"	14.25"
30m	46.336	23.168	23' 2"	23'	12"	8.75"

Table 1.

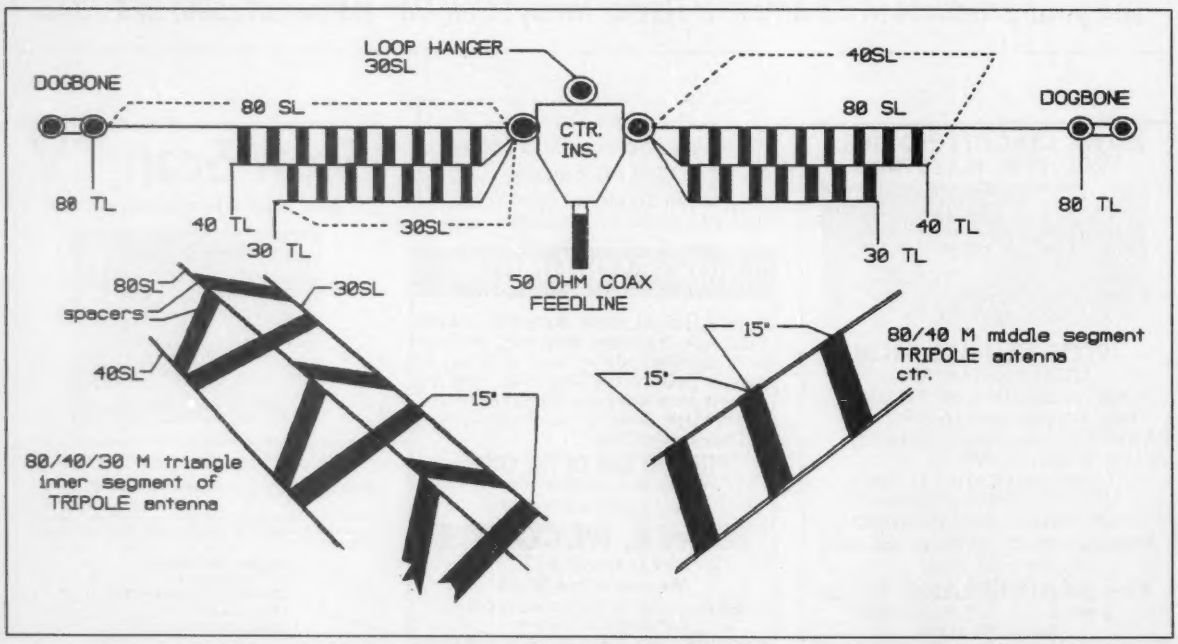


Figure 1. Tripole antenna assembly.

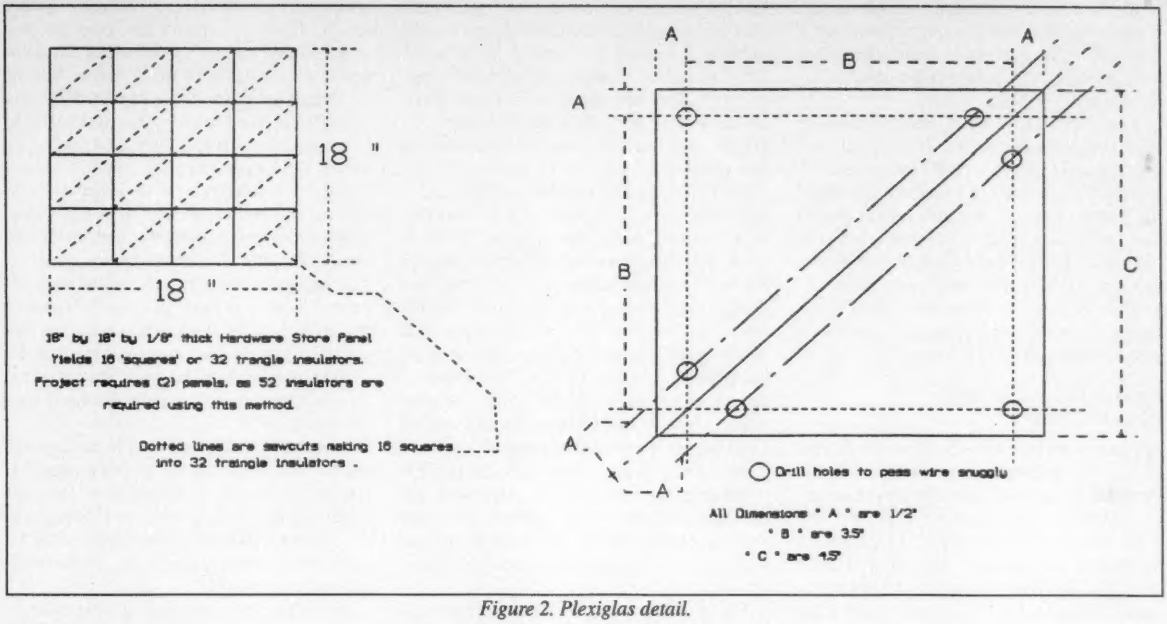


Figure 2. Plexiglas detail.

first three antennas I think I can explain the behavior being great after 30+ years of fiddling with antennas for VHF-UHF, but the exact *why* of the 160m working out so well is definitely beyond me. There are no known stub tuning or capacity effects of the 40 and 30m antennas affecting the full 80m dipole, but that seemed to be happening to some degree. Then, too, the way I put the whole thing up may have something to do with how it behaves.

How Big is "Big"?

In order to erect even a full-sized 80m dipole near my barn without looking like one of the Voice of America sites (awesome wire jobs!), I had to concede to a bit of creative wire bending. At first, my big concern was the effect the bending would have on the performance and directivity of anything I put up. That was just not to be, but more on that later.

Figure 1 and Table 1 describe the tripole's dimensions, and in each case the *finished/trimmed* length I ended up with is given, along with the calculated values and the lengths I would advise you to start out with. The column heading abbreviations represent the following: CHW is the Calculated Half Wavelength (468/frequency in MHz). This is mostly useful to determine the overall length of the antenna, and whether or not you have the space to fit it into your yard! It is never really used for anything as a cutting dimension. The way I put this one up, you need only 1.414 times the CQW length, or a lot about 90 feet wide, to have it fit. If you determine from my figures that you have the room, skip right to the CQW, the Calculated Quarter Wavelength, which is either CHW/2, or you can calculate it directly by using 234 divided by frequency in MHz. These formulas allow you to adjust this antenna for different frequencies within these bands, or even build the antenna for other

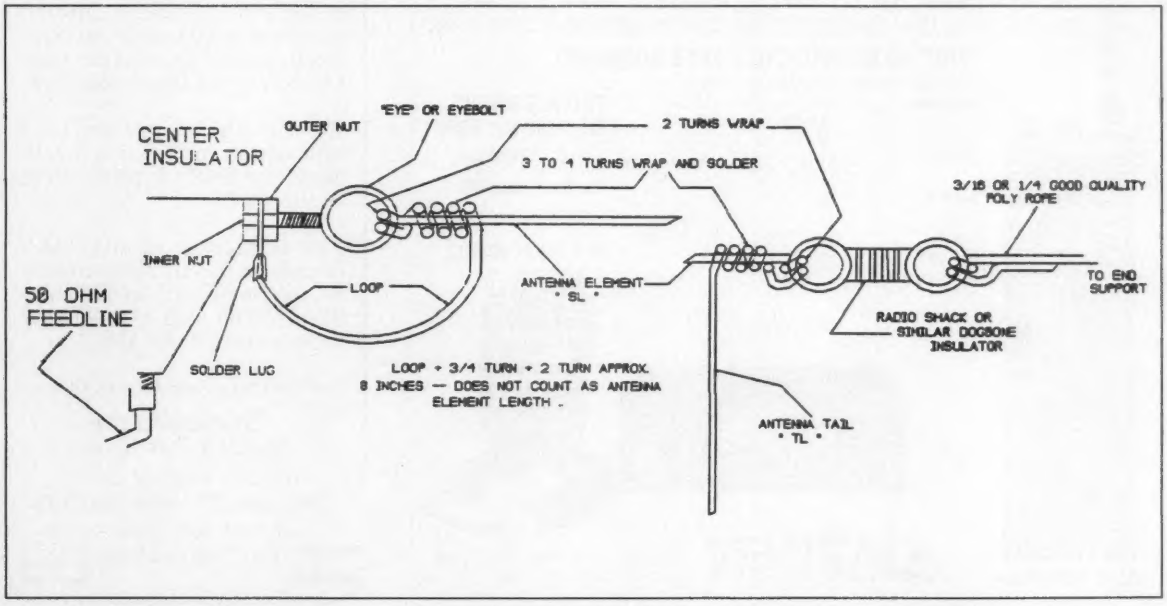


Figure 3. Insulator detail.

bands. The dimensions shown are for the following: the 80m design centers frequency = 3.840 MHz; the 40m design centers frequency = 7.150 MHz; the 30M design centers frequency = 10.100 MHz.

Next is the CQW again, just expressed in more useful feet and inches. SL refers to starting length, TL refers to "tail" length, and FT was the final amount I trimmed from *my* antenna. I emphasize *my*, because I want you to have enough left in the tails to trim to suit your particular antenna, building materials, where and how high you put it, and so on. I have tried to leave enough slack to cover all of those things. For more details, see the construction and assembly portion of this article.

Construction and Assembly (CAN Be Fun!)

Figure 1 was drawn with the three dipoles laid out flat (side-by-side) for clarity of the dimensions of each part. In reality and in assembly, the three antennas end up in a "cage" triangle arrangement that gives the antenna a much more mechanically stable look. I can't say if it really buys you anything from a windload standpoint, or if it is really more solid mechanically in that configuration than if you left it all flat, but it just plain looks better. After all, aesthetics and neighborhood appeal should count for something, right?

Yes, I have built it both ways, and the *only* difference I noted was the more pleasing look of the cage assembly, and that the flat version seemed to blow around more in the wind. The only difference in assembly is the number of spacers you have to use (less for the flat version, of course, by about 40 spacers) and when and where to put them. While on the subject of spacers, this antenna is for HF use, and there are many suitable materials you could use. I had many hundreds of gray plastic spacers that had been ribbon cable hold-downs in some type of cable TV distribution system. Plastic clothspins of all kinds work well for spacers at HF. Most work, but the best look was achieved by a friend who "duplicated" (what *real* ham ever "duplicates?) my antenna. He made his spacers out of 1/8" plexiglas material available in most hardware and plastic outlets. He started by sawing out squares 4.5" on a side. Then he sawed them to make triangles, and drilled holes to pass the antenna wire through in three places. See Figure 2 for the details. Besides more work, the only plus this buys you is just one insulator every 12 to 15 inches, instead of three . . . your option. It does make an antenna with a nice "see-through" appearance, I must say.

Figure 1 shows the layout and dimensions in accordance with the abbreviations used in Table 1. It is much easier to see what things like "tails" are in this type of drawing. One thing you must remember, if you are new at antenna building, is to leave enough wire to do wraps and solder area and the like. For that reason, I'll walk you through the 80m dipole, which you construct first. Starting with a length of wire at least 65 feet long, pass the wire through the eye of the center insulator and fold it over at about the 8" length. Use the 8" length to make two wraps around and through the eye for added strength, and the three-to-four turns tightly and smoothly around the longer wire (see Figure 3). Use a large iron or soldering gun to solder this connection, and then bring the 6" or so that should be left down in a smooth loop to reach the solder lug for that side of the center insulator. You can go ahead and solder that now, or leave it until you have all three antennas to this point. I prefer to go ahead, as the lug will probably only hold one wire anyway (built for single antennas), and you will have to wrap the other two antennas around the small loop and solder later.

Incidentally, that small loop in no way represents any of the actual antenna length! If you will notice, it is one big short from the solder lug to the eye you looped through, so the "antenna" effect is minimal at best. Do not use the loop length as part of any of the calculated antenna length.

Now, from the loop through the eyebolt, measure out the length given as SL, and mark this point (I suggest a black-ink permanent marker), then add TL, plus about 2" or so that it will loop through whatever you use as an end insulator. Don't be afraid to leave this too long—this is just like pruning legs on a milking stool. You can cut off—you can't cut on!

AZDEN

THE 6 METER FM LEADER

THE MAGIC BAND - SIX METERS. The best of both HF and VHF. Enjoy great DX during band openings and full repeater operation at other times.

BUILT TO MIL-STD-810 2 YEAR WARRANTY

SPECIFICATIONS	PCS-7500H	AZ-61
Frequencies: RX	46-54 MHz	46-54 MHz
TX	50-54 MHz	50-54 MHz
Power:	50/5 Watts	5/0.5 Watts
Sensitivity:	< 0.19 µV for 12 dB SINAD	< 0.16 µV for 12 dB SINAD
Memories:	20	40
Tones:	38	38
Keypad:	Backlit DTMF	Prog. and DTMF
DC Power:	+13.8 vDC @ 9 amps (typ)	+12 vDC @ 1.5 amps (typ) operates over +6 to +16 vDC
Size:	2"Hx5.5"Wx7.25"D	6.85"Hx2.6"Wx1.3"D

TO PLACE ORDERS CALL 1-800-643-7655

MasterCard VISA

PCS-7500H MOBILE

AZ-61 HANDHELD

AZDEN COMMUNICATIONS DIVISION

147 New Hyde Park Rd., Franklin Sq., NY 11010
(516)328-7501 FAX (516) 328-7506

CIRCLE 272 ON READER SERVICE CARD

EVERY ISSUE OF
73 Amateur Radio Today on Microfiche!

The entire run of 73 from October, 1960 through last year is available.

You can have access to the treasures of 73 without several hundred pounds of bulky back issues. Our 24x fiche have 98 pages each and will fit in a card file on your desk.

We offer a battery operated hand held viewer for $75, and a desk model for $260. Libraries have these readers.

The collection of over 600 microfiche, is available as an entire set, (no partial sets) for **$285** plus $5 shipping (USA). Annual updates available for $10.

Satisfaction guaranteed or money back!

BUCKMASTER
Route 4, Box 1630
Mineral, Virginia 23117
703:894-5777•800:282-5628
Internet: info@buck.com
VISA **Fax 703:894-9141** MasterCard

CIRCLE 168 ON READER SERVICE CARD

Just be sure the SL length is correct and double (triple) check it now, before you do anything else at the end insulator of this wire. Feed *all* the insulators of whichever type you choose to use onto the wire. Spacing is not an issue at this point, just get them all on, and double and triple check that the number present is correct! For my individual insulator construction, this is 44 insulators per side, about two every 15" as you work out from the center until you reach 36 total, and then eight more at the same 15" interval heading toward the end insulator. Now, feed the wire through the end insulator in a loop so that when the wires touch again, it is exactly at the SL marking. Make three to four turns around the main wire just like at the center insulator end, and solder thoroughly, bringing the tail away from the main antenna section at a right (90 degree) angle. The tail should be very close to 18" or slightly more. If so, you have done well. My beginning piece of wire for this segment (1/2 of the 80m dipole) was 62'10" (8" center—60'6" antenna—2" end insulator—18" tail), but I have been doing this for 30+ years! Like I said, don't be afraid to cut things long. Just be sure those SL lengths are right on—that is the antenna element!

You can now put the center insulator carefully in a vise, or tie it down to a solid object and use side one to make side two. That is another good reason for double and triple checking the first half you did. When you complete that, you have an 80m dipole—with a lot of plastic hanging on it! I like the idea of clamping the center insulator into the vise, so that I can bring the two end insulators out parallel and close to each other (a foot or so apart at the end insulator ends. This allows you to use something like a sawhorse at the end insulator ends to pull the wire out fairly taut. They must be straight and fairly close to perform the next steps.

Next Floor—Going Up, Please!

Adding the 40m elements is the next step. Again, start by measuring off two lengths of wire in the same manner as the 80m dipole. This should be something close to 34'3" (or more!)—8" + 32' 2" + 2" + 15". You can now do the center insulator connections just like you did the 80m connections using that 8" extra wire, and go ahead and do both sides. While the wire is out of the insulators and you can still accurately measure it. Start at the eye of the center insulator once again, only this time go out 32'2" on each wire and use the black marker to mark those points. Now comes the only tricky part, and all it requires is that you think ahead and don't hurry. Start with either side element, and feed the loose end through the open hole in insulator #1, one hanging from the 80m element. Skip insulator #2, hanging from the 80m dipole, and feed on the first of 18 new insulators that you will add to this 40m element. Next you go through #3 hanging from the 80m, skip #4, and add a new one from the "18" pile. Continue this "do one, skip one, add one" until you get out past the 36th of 44 insulators hanging from the 80m dipole—18 you went through, every other one (18) you skipped—and you added 18 from the pile. You can now continue on through *every* insulator (8 more) hanging from the 80m dipole, just as you would any multi-element dipole. You might want to use masking tape as I did to set these 15" intervals and keep things neat as you go.

As the 40m element goes through the last insulator, you should check that that point is right at the 32'2" mark. If all is correct, bend the remaining wire away from the 40m and 80m elements at a right angle, and tape that point as well. Repeat the process on the other 80m element with the other 40m element addition. You should now have a combination 80m/40m dipole combination, quite useable as is. I chose to add the 30m, as well, since my other antenna is a Cushcraft R-5 Vertical, and it only covers 20m through 10m.

At Last—The Last . . .

Adding the last band is simple, but you must take your time and get all the spacers right where you want them. This gets complicated because, as you thread the 30m element through the spacers (all there now, none to add), there will also be a "space" the width of one spacer *between* each of the spacers you thread through on one side. Otherwise you would cause the whole thing to bunch up. My easiest way turned out to be just do the center

Z·D ENGINEERING

Specialists in CATV Hardline Matching Transformers, Power Dividers and Related R.F. Devices.

Built to fit 1/2, 3/4, and 7/8 inch hardline, or can be custom built for other sizes of hardline and any frequency between 50 MHz and 1.3 GHz. When ordering, please include a 4 inch section of your hardline and specify the design frequency you need.

144 MHZ units are $34.95 per pair. 222 MHz, 440 MHz, 903 MHz and 1296 MHz units are $32.95 per pair.

Add $5.50 per pair UPS shipping (U.S. only).

Ohio residents add 5.5% sales tax.

Custom built prices on request.

ZD ENGINEERING

Paul H. Darwactor, W8ZD,

605 Balsley Avenue, Findlay, OH 45840

PHONE: 419-424-8765

WILL EVERYONE INTERESTED IN PREVENTING HEART ATTACK, PLEASE STAND UP?

If your only regular form of exercise is adjusting your recliner, it's time to get moving. To learn more, contact the American Heart Association, 7272 Greenville Avenue, Box 44, Dallas, TX 75231-4596.

You can help prevent heart disease and stroke. We can tell you how.

American Heart Association

This space provided as a public service. ©1992, American Heart Association

insulator work first for both sides—same instructions as the 80m and 40m—and then start feeding the loose end of the element through first the "skipped" #2 insulator on the 80m element, then through the first insulator on the 40m element, then the #4 insulator on the 80m element, then the second insulator on the 40m element, and so on until you have gone through 36 insulators. *Then* go back and space everything out nice and neat, and temporarily tape with the masking tape. You will be trying to make a nice and neat little triangle out of the three elements, keeping the wires each about the spacer hole-to-hole distance apart from one another. This forms a nice little cage about 3" on a side in my antenna, for the length of the 30m element, and then the simple 3" spaced pair out to the end of the 40m element, and of course the single wire on out to the end insulator of the 80m element. When all the spacing is nice and neat, I suggest you apply small amounts of epoxy glue (five-minute variety worked fine for me) to each side of the insulator hole where the wires pass through to keep the insulator "set" at the 15" position. You could use tape or RTV type glues if you want the ability to go back and change things as I did in the first two models. Now I have the final dimensions, you can feel safe "nailing-it-down" with more permanent gluing methods.

Some general information may be of interest. Not only did I want this antenna to serve the needs created by my new license; I also wanted an antenna that could be easily duplicated just about anywhere, so a lot of the parts ended up being from mail order in *73* magazine (so I *know* you can get them also), or from my friendly neighborhood Radio Shack store. I have no less than four of the latter on my way home, depending on the routes I take, and I keep all of them busy (and puzzled) a lot. The wire I used is from Radio Shack, and is seven strands, twisted copper, about 14 gauge, and is RS part #264-1312. The center insulator I obtained by mail order from Cable X-perts, and it is 1:1 direct connect (no balun). The insulators I explained, but you can use the plastic clothspin idea just as well—just keep the spacing at about 3". In fact, a quite colorful (kinda mod and neat) one was built this way with the "see-through" plastic clothspins of various colors arranged symetrically working, out from center. The end insulators have been either the quite common dogbone plastic variety from Radio Shack (RS part #278-1336), some teflon ones I bought at Dayton some time ago, or even the 1/8" plexiglas I mentioned earlier in the triangle insulators. I *do not* recommend the last one and mention it only because it is tempting if you are going to use the clear plexiglas for the rest of the insulators. The stress at the ends, due to the antenna weight, seems to be able to "knaw" through this type of insulator every time when used this way. It is worth the small cost to go the Radio Shack direction.

Up, Up, and Away!

The only additional tip I can offer is this: Be very careful when installing antennas. Stay away from power lines—*period*! Not only will they detune *any* antenna put near them, they can do a real mean number on *you!* By the way, *you do not* have to actually *touch* them! That is a myth. Should you be unfortunate enough to be around the higher voltage distributions that come right through neighborhoods along with the lower house feed systems, you have not only have *bare* wires to deal with, you also have considerable *fields* out from those wires. Remember your basic electronics: Pass current through a wire (in this case, the high-voltage line) and bring another wire (your antenna) close to it—and you get *induced* voltage, folks.

My antenna was put up as follows, for those who want a carbon copy of my results. The apex (center insulator) is 86 feet from the hamshack, in a due-east direction. From there, the two legs of the antenna go out to the compass points of 45 and 135 degrees (about to the NE and SE), meaning there is a 90 degree apex angle much like an inverted "V." The big exception is, the legs go straight out, not down, from the apex point. I seem to have the desired and expected E-W coverage, and yet the antenna is *not* running directly N-S as you

Continued on page 79

Are you looking for the best satellite news, information and ideas? ***Satellite Times*** covers every aspect of space communications--from commercial, military and broadcast, to amateur, scientific, government, and even private satellites.

Every bimonthly issue is filled with the most up-to-date topics and will bring you into a new era of monitoring.

ST will give you the knowledge you need to successfully monitor and utilize all forms of satellite communications.

Satellite Times™

Grove Enterprises, Inc.
Publisher, ***Monitoring Times***

Subscription:
1 year US: **$19.95** (6 issues)
2 years US: **$36** (12 issues)
3 years US: **$52** (18 issues)

1 year foreign: $26 (6 issues)
2 years foreign: $50 (12 issues)
3 years foreign: $76 (18 issues)

(800) 438-8155

PO Box 98
Brasstown, NC 28902
Toll line: (704) 837-9200
Fax line: (704) 837-2216

THE NEWEST STAR IN SPACE

CIRCLE 280 ON READER SERVICE CARD

73 Review

Number 10 on your Feedback card

by Gordon West WB6NOA

Heil, Ltd.
2 Heil Drive
Marissa IL 62257
Telephone: (618) 295-3000
Price Class: ProSet $135.95 w/adapter cable
Pro 5 $119.95 w/adapter cable

The Heil Headsets with Boom Microphone

Listen to these quality featherlight units.

Last summer at Field Day a 20 meter station was using a Heil Pro Set headphones and microphone assembly that looked inviting to try on. When it was my turn at the rig, I went for the Heil headset to give it a try and couldn't believe how comfortable it was.

The first thing you notice while putting on the headset is how extremely lightweight it is. Unlike older headsets that would cramp your ears and weight your head and neck, the dual-earpiece headset weighs only 10 ounces, and the single-earpiece headset weighs seven ounces. Ultra-lightweight!

The headset earpieces are cushioned with a material that feels like foam and is covered with a micro-thin supple black vinyl. The vinyl has little grooves in it to allow air to circulate around the cushion, cutting down on sweat. But when you put the earpiece on, it effectively blocks out any extraneous noise.

The single- and double-earpiece headsets have a lightweight Heil microphone boom set that can be adjusted close to your mouth. Inside the plastic noise-canceling microphone pick-up enclosure is an element developed especially for maximum clarity on SSB. We looked at the response of this element on a scope, and it drops off quickly under 375 Hz as well as above 3000 Hz. The natural peak of the boom set microphone was around 2.4 kHz, for excellent articulation in the normal speech range. You can easily hear the difference between a Heil element on the air versus typical traditional microphone elements found in the mikes that accompany most HF and VHF sets.

The flexible boom mike terminates to the left earpiece. For some reason, I always use a microphone coming in from the right side of my face. There is no provision to change this, so get used to the mike coming in from the left! It took me all of about 10 minutes to accomplish this.

Whether you order the single earpiece or double earpiece Heil headset with boom mike, they come with a plug assembly that is common to the headset with a mono or stereo one-quarter-inch phone plug and a miniature phone plug. Both of these plugs go into a color-coded six-inch pigtail assembly that matches the microphone input for the following rigs:

Blue for ICOM
Yellow for Yaesu
Red for Kenwood
Red for most Alinco
Black for Ten Tec
White for Collins
Others by special request

Good news—you don't need to drag out that miniature soldering iron to play around with sub-miniature wires onto micro-miniature contacts on a microphone plug. The mike plug pigtail simply inserts into your favorite HF or VHF/UHF transceiver, and the boom set plugs into the pigtail. But wait—where's the PTT? The push-to-talk switch is a lightweight but heavy-duty foot switch that goes on the floor for a convenient method of controlling your station. The heavy-duty foot switch we tested has a non-skid rubber pad, complete with a seven-inch cable that plugs into the pigtail. If you don't like the foot switch, you can order up the HS-1 hand switch which, is similar to those air traffic controllers use. Both allow hands-free operation, and both switches terminate into a one-quarter-inch phone plug that interfaces to both the Heil boom set and the microphone.

"At first we came out with the double-earpiece headset, but by popular demand from those operators wishing only a single-earpiece headset, we now offer the Pro 5, which is identical to the double-earpiece headset," comments Bob Heil K9EID. "Here at Heil Sound, we believe in human-engineering all of our microphone systems to the requirements of the radio operators—so whether they want one ear covered or both, we have it!" adds Heil.

If you have several different radios, you can use the headset between them with additional pigtail connectors. Each cable is about $22.

The professional quality boom sets for amateur radio, including one color-coded pigtail for your particular style transceiver, sells for around $135. A descriptive catalogue showing all of the different combinations of the headsets is available by writing Heil, Ltd., 2 Heil Drive, Marissa, Illinois 62257; (618) 295-3000.

You might also ask for details on the Heil ham radio handbook that I feel is one of the best $10 values for the new amateur operator learning all about the hobby. It's a fun and descriptive book, written by Heil. It's the best I've seen.

Photo A. This headset felt comfortable even after several hours of Field Day testing.

Photo B. The boom mike element is housed in a noise-cancelling enclosure.

HAMSATS

Amateur Radio Via Satellites

Andy MacAllister WA5ZIB
14714 Knights Way Drive
Houston TX 77083

The AMSAT Annual Meeting

The 1994 AMSAT Annual Meeting and Space Symposium was held October 7-9 in Orlando, Florida. Over 200 satellite enthusiasts listened to dozens of presentations, visited the Phase 3D integration facility and made satellite contacts using an impressive antenna array set up outside the convention hotel. For all participants, it was a fantastic weekend.

Friday

The paper presentations began Friday afternoon with updates on the Shuttle Amateur Radio EXperiment (SAREX) by Frank Bauer KA3HDO, John Nickel WD5EEV, and the program's Principal Investigator Lou McFadin W5DID. SAREX did very well in 1994 with increased random contacts and many fine scheduled contacts with schools from the ham-astronauts. Joan Freeman KD4SRD presented a SAREX case study describing how her school prepared for and operated during their contact with Bob Cabana KC5VBH on the *Columbia* Orbiter during STS-65.

Dennis Wingo KD4ETA provided an update on the *SEDSAT* program. *SEDSAT-1* is a microsat-class satellite that will be flying as a secondary payload as part of NASA's Small Expendable Deployer System (SEDS). Changes in launch schedules have caused delays with this hamsat. *SEDSAT* will carry several scientific and amateur-radio experiments. The main purpose of the satellite is to test the dynamics of tethered satellites and remote sensing. Dennis also presented ideas on a *SEDSAT*-class, amateur-radio satellite to be placed in lunar orbit.

Dan Schultz N8FGV delighted the audience with his pictures from the Hubble Space Telescope. Dan showed several images representing photos before and after the shuttle repair mission, a few of which were included as handouts for those attending.

AMSAT Director Bob Diersing N5AHD told the story of *DOVE*'s recovery. The process to bring *DOVE-OSCAR-17* back online and make the satellite talk has been long and hard. Many volunteers have been involved in the process since launch. Bob also outlined plans for *DOVE*'s future to include easier recovery from problems and more speech transmissions from the spacecraft. Efforts are underway to allow the satellite to transmit telemetry values using voice.

Last year David Liberman XE1TU could not present his paper on the UNAMSAT microsat project from Mexico. He was feverishly preparing for launch. Due to many delays with the Russian commercial/military launcher program, UNAMSAT is still not in orbit. This year David was able to talk to the symposium and describe UNAMSAT's proposed operation, what to expect and how to use the data once the satellite is in orbit. With an extra year to refine the satellite, David and his group in Mexico have been able to further study and test the complete system on the ground. The meteor scatter experiment, using a low-VHF transmitter/receiver, has worked extremely well and should provide excellent results in orbit for meteor ionization trail propagation studies by both students and amateur radio operators.

Philip Chien KC4YER finished the day's talks with a quick look at launch opportunities beyond Phase 3D. Philip pointed out the difficulty amateurs will have in the future finding rides to orbit. He noted that the amateur community should be ready to go on short notice when a launch opportunity becomes available. Many potential rides have already been missed.

Saturday

Activities began in earnest at 8 a.m. when AMSAT President Bill Tynan W3XO gave an official welcome to the symposium participants and introduced the symposium Chairman Al Brinkerhoff WB5PMR. Al has been an active satellite chaser for many years and coordinated an AMSAT meeting and space symposium in Dallas several years ago. He and his crew of volunteers did an incredible job in Orlando. Registration was easy, the prizes after the banquet were great and the communications bus from Florida Power and Light provided an excellent mast for the satellite antennas used by the symposium satellite station.

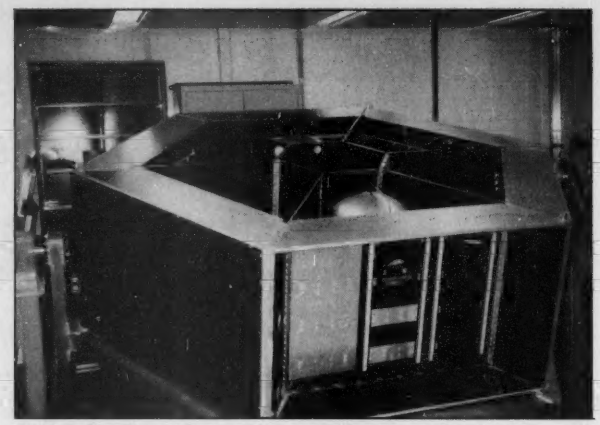


Photo A. The Phase 3D assembly is currently under construction in a special clean room at the Orlando International Airport Foreign Trade Zone. Tours of the facility were part of the symposium.

Professor Robert Twiggs of Stanford University gave the first talk of the day. Bob's presentation paralleled the symposium paper by Christopher Kitts and Richard Lu on the Stanford SQUIRT Micro Satellite Program. SQUIRT stands for Satellite Quick Research Testbed and represents an opportunity to prepare and launch educational payloads designed to operate within the parameters of the amateur radio satellite service. The first SQUIRT is to be called *SAPPHIRE* for Stanford Audio Phonic Photographic Infrared Experiment. It will be hexagonal in shape, nine inches tall, 16 inches in diameter and weigh roughly 25 pounds.

Peter Guelzow DB2OS gave two presentations on Saturday. His first was based on the paper "The Re-Entry of *OSCAR-13*" by James Miller G3RUH. Due to the pull of the moon and sun, AMSAT-OSCAR-13 is expected to re-enter the atmosphere and crash to earth in late 1996. James' guess is December 5, 1996. Peter's second paper was presented later in the day. It covered the Controller Area Network, or CAN, that will be used for digital communications between subsystems onboard Phase 3D.

AMSAT President Emeritus Dr. Tom Clark W3IWI described his Global Positioning System (GPS) experiment for Phase 3D. He titled the talk "Where Am I and What Time Is It?" Through the use of multiple GPS receivers on Phase 3D, Tom proposes to not only define the exact position of the spacecraft at any instant, but also to preserve extremely accurate time on the craft, maintain a set of orbital elements for transmission with the telemetry, and to accurately define the orientation of the craft with relation to the sun and earth. It's an ambitious project, but other groups around the world are showing interest in Tom's proposed uses and other possible ramifications of having such satellite data available.

Walter Daniel KE3HP followed Tom with a presentation on the use of star cameras for satellite attitude determination. Doug Loughmiller KO5I/GØSYX came after Walter with his description of the small satellite programs at the University of Surrey in England. Doug is a past president of AMSAT-NA and a longtime hamsat enthusiast. His presentation was well received. Later in the day he spoke on the AMSAT-UK contributions to the Phase 3D program.

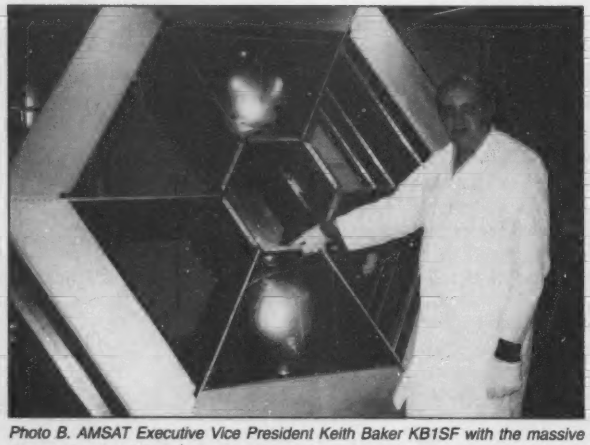


Photo B. AMSAT Executive Vice President Keith Baker KB1SF with the massive Phase 3D space frame in the clean room.

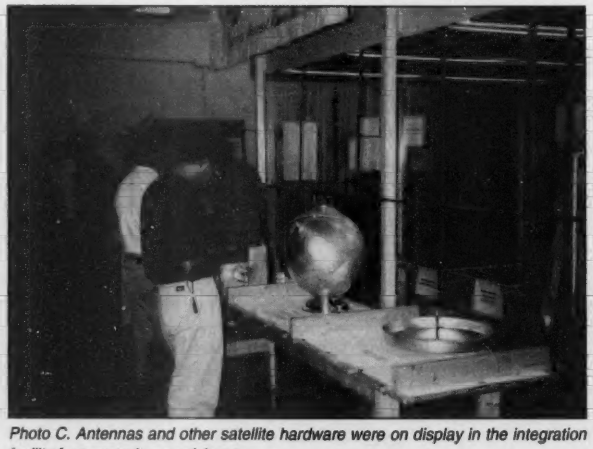


Photo C. Antennas and other satellite hardware were on display in the integration facility for symposium participants.

DAYTON hamvention® '95

April 28, 29,30, 1995

General Chairman, Ken Allen, KB8KE

Asst. General Chairman, Dick Miller, N8CBU

✷ Giant 3 day Flea Market ✷ Exhibits ✷ Activities for the Non-Ham

When and Where
April 28, 29 and 30, 1995; Dayton, Ohio at Hara Arena

Communications
FAXMail (information sent to you via FAX): (513) 276-6934

BBS via America Online: Keyword "Ham", Select "Hamvention"

PHONE: (513) 276-6930. For fast response, please obtain the committee Voice Mail box numbers via FAXMail or BBS.

FAX (incoming): (513) 274-8369

MAIL: Hamvention, Box 964, Dayton, Ohio 45401-0964

Special Services
Lodging information and special award nomination forms are in our 1994 Program. Call FAXMail or BBS for more information.

License Exam by appointment only. Call FAXMail or BBS for details.

Deadlines
In order to have time to return tickets to you, we must have advanced reservation orders postmarked not later than April 8 (USA) or April 1 (Canada). Tickets will not be mailed before January 15th, 1995. Ticket requests that are received **AFTER** the deadline will be processed and **HELD** for pick-up at Hara Arena. Tickets can be picked up beginning Thursday, April 27 at 8:00 a.m.

Flea Market
Flea Market Tickets (valid all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. A maximum of 3 spaces per person (non-transferable). Electricity is available in a portion of the last Flea Market row for $40 additional per space. Rental tables and chairs are not available in the Flea Market. Vendors ***MUST*** order an admission ticket for each person when ordering Flea Market spaces. Please send a separate check for Flea Market space(s) and admission ticket(s). Spaces will be allocated by the Hamvention committee from orders received by February 1. Please use 1st class mail *only*.

Notification of Flea Market space assignment will be mailed by **March 15, 1995**. Checks will not be deposited until after the selection process is complete. Please indicate in the box below if you would like to attend regardless of Flea Market space assignment.

Free bus service
Free bus service will be provided between Hamvention, Air Force Museum, Salem Mall and Forest Park Mall parking areas. We are investigating ways to improve service to hotels. Please call our BBS or FAXMail for specific information.

Returned Checks
A $20 service charge will be assessed on all returned checks.

HAMVENTION Is sponsored by the Dayton Amateur Radio Association Inc.

Advance Registration

Enclose check or money order for amount indicated in U.S. dollars and type or print your name and address clearly.

Make checks payable to:
Dayton HAMVENTION Mail to -
Dayton Hamvention Box 1446, Dayton, OH 45401-1446

Flea Market tickets *Please check one and enclose **two** checks.*
- ❑ Send admission tickets **only** if flea market space(s) assigned.
- ❑ Send admission tickets **regardless** of flea market space assignment.

	How Many		
Admission (valid all 3 days)	_____	@ $12.00*	$_____
Grand Banquet	_____	@ $23.00**	$_____
Alternate Activities			
Saturday Luncheon	_____	@ $9.00	$_____
Sunday Luncheon	_____	@ $8.00	$_____
Flea Market ‡ (Max.3 spaces)	_____	$35/1 space	
	_____	$70/2 adjacent	
	_____	$160/3 adjacent	$_____
Electricity add	_____	$40.00/space	$_____
Covered tent	_____	$230.00 ea.	$_____
		Total	$_____

Name _____ Call _____

Address _____

City _____ State _____ Zip+4 _____ – _____

Daytime Phone # ( ) _____ Evening Phone # ( ) _____

* $15.00 at door
**$25.00 at door, if available
‡ Admission ticket must be ordered with flea market spaces

Photo D. AMSAT Vice President of Engineering Dick Jansson WD4FAB and Jan King W3GEY with the burst-tested fuel tank in the integration facility.

The morning talks concluded with an update on the TAPR/AMSAT DSP-93 Project. The Tucson Amateur Packet Radio, Inc. group and AMSAT agreed a few years ago to jointly fund a program to design and eventually market kits using Digital Signal Processing (DSP) to make a new modem based on software that could be connected to a standard Terminal Node Controller (TNC). The result is the DSP-93. The first production kits were out in November. The second round are scheduled for release in early March, and at least 100 should be available from TAPR and AMSAT at the Dayton Hamvention in April. The initial offering included software for 1200 baud AFSK (standard VHF packet), 300 baud AFSK (standard HF packet), 1200 baud PSK (for use with microsats), 9600 baud FSK for both terrestrial and full-duplex satellite operation, and a number of audio filters. Several other software efforts are underway for release in early to late 1995 including APT for weather satellites, a digital oscilloscope, SSTV (slow-scan television) and other HF modes.

The afternoon topics proved to be a very detailed and intense session on the current status and future efforts regarding the Phase 3D program. Phase 3D promises to be the most versatile and expensive hamsat yet. The international coordination needed to bring it all together is phenomenal. AMSAT President Bill Tynan W3XO provided opening remarks describing Phase 3D as a new era for amateur satellites.

Dick Jansson WD4FAB presented the latest findings and engineering studies on the mechanical and thermal design. Stan Wood WA4NFY showed the antenna designs and locations on the space frame for antennas covering VHF, UHF and microwave bands. Peter Guelzow DB2OS described material from Dr. Karl Meinzer DJ4ZC of AMSAT-DL on the RF subsystems and attitude control. Lyle Johnson WA7GXD talked about the computer for satellite housekeeping and a new digital communications experiment to be incorporated into the craft. Other topics covered during the afternoon session included the Phase 3D propulsion system by AMSAT Director Dick Daniels W4PUJ, more on GPS by Tom Clark W3IWI and his crew and, finally, concluding remarks from Steve Park WB9OEP, who did a great job keeping the presentation schedule running smoothly.

Following a short break to allow everyone to catch their breath and relax after data input overload, the yearly banquet began. The speaker was Dr. Paul Shuch N6TX. His light but informative topic was "The Search for Dark Matter." Paul has that unique ability to make the most complex topic both understandable and fun. Prizes and AMSAT awards finished the evening. The prizes ranged from books and maps to S-band gear from SSB Electronics and an ICOM 281H mobile transceiver.

Photo E. Joan Freeman KD4SRD presented a SAREX case study on how she got involved in the Shuttle Amateur Radio Experiment program with students in her school.

Sunday

Following the Field Operations breakfast at 7 a.m., the talks began again with topics devoted to operating via the hamsats. Keith Baker KB1SF started the forum with advice for beginners. Paul Shuch N6TX continued with a talk on orbital slight of hand and Ed Krome KA9LNV discussed feed system alternatives for mode "S" (2.4 GHz) reception.

QSO Tutor®
Study Aid for the Amateur Radio Exams

Mac® IBM®

QSO Software
Specialist in Software for the Micro by WB3B

• Runs on IBM compatibles or Macintoshes
• Programs are available for Novice, Technician, No-Code Technician, General, Advanced and Extra Amateur class exams as well as Commercial Radiotelephone and Commercial Radar Endorsement. Each program sold separately.
• Work with the entire question pool, or study questions automatically selected by the program from your weakest areas.
• Current Question Pools
• Includes full screen graphics, explanations on appropriate questions and, on the IBM version, a pop-up calculator.
•Logs multiple study sessions and allows resuming at a later time. Returns to review missed questions if desired.
• Creates randomly generated sample tests on-line or printed with graphics on Epson/IBM or Macintosh printers.
• Public Domain Morse code tutor is included on request at no extra charge.

Compare the features - No other theory tutor contains the entire question pool, explanations, graphics, progress analysis and automatic concentrated study where you need it.

"Great Programs - I passed the advanced and extra licenses both in one morning! After 12 years as a general. The sample test portion really got me going! See you in the pileups! " **WB8YJF**

"As far as I am concerned, there is nothing like the QSO Tutor program. I have tried another and believe me, there is no comparison." **KA3ZBE**

"The most advanced program I've tried ... Graphics are extraordinary ... This program should be your first consideration.." **Gordon West - Worldradio**

"Do I recommend the QSO Tutor? Heartily, yes! It really motivated me and it's a great way to test my progress. The learning is a natural by-product of the fun I am having." **Jim Ball - 73 Magazine Review**

Also Available :
QSO Controller®
The ultimate companion for controlling late model Kenwood rigs.
• Full mouse driven graphical user interface.
• Controls all functions of TS-950, 940, 850, 811, 711, 450, 440 and 140.
• Includes integrated logging, custom scanning, extended memories with annotation, real time S & multi-meters on screen, GMT, in/out-of band conditions by license class, and much more.
• Available for Macintoshes and IBM compatible (EGA or VGA only)
• Call or write for details
$99.95

$29.95 per class for Novice thru Extra and Comm. Radar
PA residents add 6%. Price includes shipping.

$39.95 per class for No-Code Tech (Novice and Tech programs) and Commercial Radiotelephone

QSO Software
208 Partridge Way
Kennett Square, PA 19348
215-347-2109 (Voice or FAX)

1 800 483-3973
(1 800 GUD DX 73)
Ordering info only please!

CIRCLE 145 ON READER SERVICE CARD

TRANSMITTER LOCATION

Direction Finding System Tracks Down
• Stuck Microphones
• Cable TV Leaks
• Jammed Repeaters & Cell Sites

Models available with computer interface, synthesized speech, for fixed or mobile use, covering 50 MHz to 1 GHz. Call or fax for details

CIRCLE 13 ON READER SERVICE CARD

Photo F. An operational hamsat station was set up at the Holiday Inn for interested symposium participants to operate.

Gould Smith WA4SXM described activity via the Russian RS satellites. Ned Sterns AA7A explained how the K7TR Field Day group won the 1994 AMSAT Field Day competition. Roy Welch presented information on AMSAT software and John Hansen WAØPTV reported on software for the digital birds.

During the sessions, special buses were available to take symposium participants to the Phase 3D integration lab at the Orlando International Airport Foreign Trade Zone. The integration team had set up several displays of the satellite systems, the space frame in its clean room and various experiments to demonstrate GPS, satellite attitude control, and antenna efforts. At the same time, the AMSAT Board of Directors meeting began.

Bill Tynan coordinated the board meeting, which lasted through mid-Monday with a few breaks for food and sleep. The agenda covered many items, including publications, SAREX, the DSP project status, long-range planning, commercial relationships, new satellites and the budget. AMSAT has a significant challenge ahead to pay its part of Phase 3D and still maintain its many other activities. Work on fund raising will continue to dominate AMSAT's operations until the launch. Discussions were also started on AMSAT's future beyond Phase 3D. Although many attending the Board of Directors' meeting may have found the conversation more like a philosophy session, it got everyone thinking: Where do we go from here? What's next?

Orlando, Florida, may be the site again for the 1995 meeting; an announcement is expected soon. It is sure to be a fascinating event since Phase 3-D will be near completion and just about ready for launch.

Copies of the Proceedings of the symposium are available from AMSAT or the ARRL. The book is 8-1/2" by 11", 154 pages, and softbound. It's well worth the cover price of $12. AMSAT can be contacted at 1-213-589-6062 for details on shipping charges.

Straight Key Night

For many years the ARRL has sponsored Straight Key Night (SKN) on New Year's Eve and New Year's Day. In 1972 a group of satellite chasers decided to try their hand at some straight key CW via *OSCAR-6* during SKN. The idea caught on and the tradition has been maintained whenever there has been a satellite available for the event.

AMSAT Vice President of International Affairs Ray Soifer W2RS invites interested satellite operators to participate in the 23rd annual SKN via OSCAR. He reports that there are no rules, no scoring, and no need to send in a log. Just call CQ SKN in the CW passband segment of an OSCAR between 0000 and 2359 UTC on January 1, 1995, or answer a CQ SKN call from another station. Contacts via the moon also count. Nominations for best "fist" can be sent to W2RS @ WA2SNA.NJ.USA.NA via packet or to W2RS@AMSAT.ORG via the Internet. You can also use his callbook address.

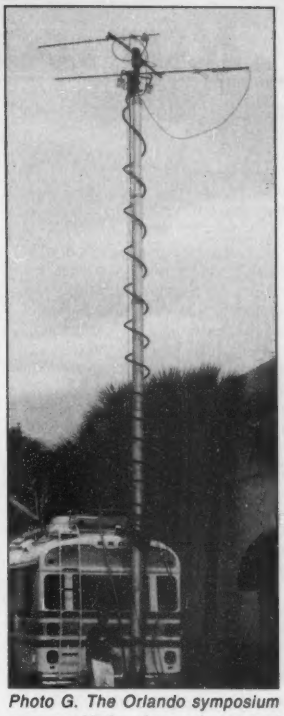
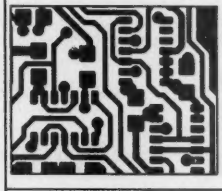


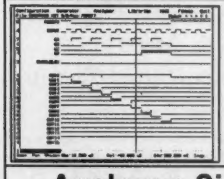
Photo G. The Orlando symposium crew provided an impressive support for the satellite antennas. (K1MON photo.)

PCB / Schematic CAD - from $195



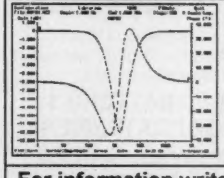
EASY-PC - For single sided and multilayer boards to 17"x17". Phenomenally fast and easy to use. Over 18,000 copies in use worldwide. **EASY-PC Professional** for boards up to 32" x 32" at .001" resolution, 16 layers. Schematic capture and netlist extraction - integrates seamlessly with PULSAR and ANALYSER III. **Runs on PC/XT/AT/ 286/386/486 with EGA or VGA displays.**

Logic Simulation - from $195



PULSAR and PULSAR Professional - Full featured digital logic simulators. Allow you to test your designs **quickly** and **inexpensively without the need for sohisticated test equipment. PULSAR** can detect the equivalent of a picosecond glitch occurring once a week! **Runs on PC/XT/AT/ 286/386/486 with EGA or VGA displays.**

Analogue Simulation - from $195



ANALYSER III and ANALYSER III Pro. Powerful linear circuit simulators have full graphical output, handle R's,L's,C's, Bipolar Transistors, FET's, Op-Amp's, Tapped Transformers and Transmission Lines etc. Plots Input and Output Impedances, Gain, Phase and Group Delay. Covers 0.001 Hz to >10GHz. **Runs on PC/XT/AT/286/386/486 with EGA or VGA displays.**

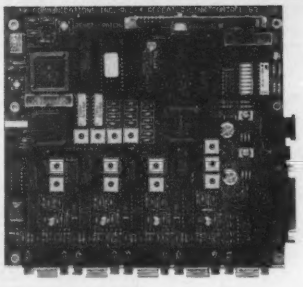
For information write, fax or call:

Number One Systems

REF: 73, 1795 Granger Ave., Los Altos, CA94024
(415) 968 9306
VISA and MasterCard welcome.

CIRCLE 1 ON READER SERVICE CARD

4 PORT REPEATER AND LINK CONTROLLER



FEATURES:

- 4-full duplex radio ports
- Optional Autopatch available
- Unique CW for each port
- DTMF control from any port
- 100 user command macros
- 300-9600 baud serial port
- 4-Layer board construction
- Priced for any groups budget

RLC-4 REPEATER CONTROLLER

Benefits:

With DTMF and serial programming features, your controller is more secure from unwanted access. Use only 1 controller at your site to control up to 4 separate repeaters/links with their own personalities and features intact. Make emergency autopatch calls with the telephone option. Only the RLC-4 can make these features available at such a low price.

ONLY $375.00

Link Communication, Inc.
115 2nd Ave. N.E., Sidney, MT 59270
Call for informaion about our complete line of controllers
(406) 482-7515 (Voice) (800) 610-4085 (Orders) (406) 482-7547 (Fax)

CIRCLE 47 ON READER SERVICE CARD

Number 12 on your Feedback card

RTTY LOOP

Amateur Radio Teletype

Mark I. Leavey, M.D., WA3AJR
6 Jenny Lane
Baltimore MD 21208

With the customary greetings, let me be among those of your old friends to wish you a happy and healthy new year. In this changing world, may 1995 be a year of peace and prosperity for you and yours. Now, to the business at hand. A dip into the mailbag this month.

Jim Hale KJ5TF of Kingston, AR, sends along a note which relates that he would "like to try RTTY, but I hear that I may find it difficult with low power.

"My home is in the backwoods and power poles are about $30,000 away. We have built up our solar and battery system over the years and are quite happy this way.

"My old batteries are retired telephone cells and I don't like to run more than 30 watts. My Ten-Tec Argo only has a maximum power of 50 watts.

"What band is the most interesting for RTTY and PACTOR?

"If I built a two- or three-element delta loop beam on that band, would my low power be okay? I have wire loops in the trees all around the house, and they work very well versus dipoles. I could aim one east, and another west.

"I don't want to spend a lot on a controller. What are some 'older' modems I could use with my 386 laptop?"

Well, Jim, these are some very wide-ranging questions. The photo on your QSL card looks idyllic, but I see your problem! First off, my congratulations on being able to supply your own power away from the commercial grid. That alone might be the subject of another article. Don't worry, though, as with other amateur modes, communication on RTTY is as much a factor of technique as anything else.

If you can hit a local packet repeater, commonly called a digipeater, that might be your best entry point. Monitor some of the common frequencies, such as 145.01 or 145.03 MHz, for the distinctive "brrrp" of digital communications.

Now, on HF, given your Argo, I would suggest two options. Listen around 3620 kHz for RTTY signals, and try to answer a CQ you can hear well. The other popular venue for RTTY is 20 meters, with 14.080 MHz being the center of the street. Once again, depending on how well you can hear signals, communication should well be possible.

As far as modems go, you have at least two choices. You could try to obtain an older modem, such as the HAL ST-5 or ST-6, IRL, or Flesher units, and use a terminal program such as those discussed in recent months, and available in the "RTTY Loop" collections. Alternatively, there are small, dedicated controllers that work with programs such as Baycom or PMP. Again, scan the ads here in *73* and the programs in the collection.

Overall, don't let these obstacles stand in your way any more than your distance from the power lines did. Good luck, and let us hear about your success!

Some want to get on, others want to get off. Let me share these two letters with you, as well:

Sheldon Daitch WA4MZZ, Box 182, Louisville, GA 30434-0182, writes of his large assortment of Model 28 TTY and Northern Radio manuals that he will pass along to interested RTTY buffs for the cost of postage. He says that he's carried these manuals around for several moves, and now wants to put them in a good home, rather than toss them. I don't know what he still has, as of this publication date, but it's worth a stamp if you're interested.

On the other hand, Joe Brugman WB6ALI, of Whittier, CA, wrote with some follow-up of his search for takers of equipment last year. After mentioning the availability of the mechanical teleprinters, no one exactly beat his shack door down. Then, he got an idea that maybe one of the movie prop rental houses would like to have it. After all, he does live near enough to Hollywood! Anyway, after some calling around, he located a company that accepted the material, presumably to use as a prop in some future production. Joe looks forward to tuning in one day and seeing his legacy being tuned on!

With movie and other theatrical productions taking place all over these days, even Baltimore has seen productions from the movie "Avalon" to the weekly TV show "Homicide" being produced here. This is another place to investigate when you move off the green keys to the green screen, so to speak.

Eric WA8ZJY sent along a question via AOL, in which he refers to a comment regarding possible modifications to the Hal DS 3000 to allow for output to a printer. He is also interested in any other modifications that may be available for this device. Having used it in conjunction with a Model 28, he would like to put the mechanical teleprinter aside and use a more power- and noise-efficient printer or file storage such as a PC. Anyone using the DS 3000 in this way, we all would appreciate hearing from you.

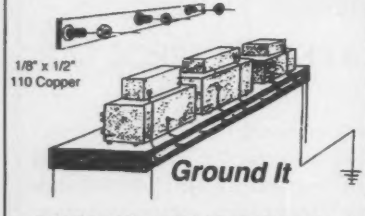
Another AOL fan is David Laustsen N3LHY, of Doylestown, PA. David writes that he has a Mac Centris 650 running system 7, with a PK232MBX used on RTTY, AMTOR and PACTOR. He has the AEA software MacRatt with FAX. Having gone round and round with AEA, David can't get the program to work on this new Mac. It worked OK on the old "toaster" Mac. He has friends who have had the same problems and have either gone to a dumb terminal program (as he has for now) or sold the 232 and gone with the KAM. Enough background. The question is: Is there any software out there for the Mac family that will run on System 7 and do a decent job of controlling a 232 on the HF modes?

Well, you might look around on America Online's Ham Radio SIG (go ham radio). There is a library of Apple programs, and while I can't say for sure that there is a program in that library for you, it may be your best first show. Again, I look forward to hearing from you.

All these folks are dropping me Email online, and you want to get in on the fun? Write me via America Online (MarcWA3AJR), Internet (MarcWA3AJR@aol.com), CompuServe (75036,2501), or Delphi (Marc WA3AJR). Sure, snailmail to the above address is OK, too! All seven of the RTTY Loop disks remain available. Drop me a line for the listings and details. For now, that's a wrap, and we'll see you next month here, in "RTTY Loop."

Subscribe to *73 Amateur Radio Today* Call . . . **1-800-289-0388**

Is Your Shack Grounded?



Solid Copper Buss Stainless Steel Hardware
Grounding Stud Every 6 Inches
Top or Back Installation

Ground all of your equipment chassis's to a single earth ground in one easy installation. Money back guarantee, if not satisfied!

+$4.00 S/H each
Mail check/money order to:
J.M.S.
35 Hilltop Ave., Dept. 7
Stamford, CT 06907

2 ft.....$11.95
3 ft.....$16.95
4 ft.....$21.95
Custom Lengths Available

J. Martin Systems

CIRCLE 26 ON READER SERVICE CARD

CABLE TV AND ATV
Video Sync Generator
New Universal Product

4000 Kit $79.95
4000A Enclosure Pak $44.99
5000 Fully Assembled $199.95

Features Include:
- Locks in unstable UHF for ATV.
- The latest in Video Amp. Technology.
- Advanced picture locking circuitry.
- Latest clocking circuit for best color.

The Halcyon Group
P.O. Box 2264
Sarasota FL. 34230
1-800-664-6999

CIRCLE 94 ON READER SERVICE CARD

Say You Saw It In
73 Amateur Radio Today

BATTERIES

Nickel-Cadmium, Alkaline, Lithium, Sealed Lead Acid For Radios, Computers, Etc. And All Portable Equipment

YOU NEED BATTERIES?
WE'VE GOT BATTERIES!
CALL US FOR FREE CATALOG

E.H.YOST & CO.
7344 TETIVA RD.
SAUK CITY, WI 53583
(608) 643-3194
FAX 608-643-4439

CIRCLE 114 ON READER SERVICE CARD

MFJ *super* DSP *filter*

. . . Tunable "brick wall" bandpass, lowpass, highpass, notch, SSB, CW filters . . . programmable pre-set filters . . . automatic multiple notch filter eliminates heterodynes . . . adaptive noise reduction reduces noise and QRN . . . for Voice, CW, Data . . .

Only MFJ gives you
tunable and programmable "brick wall" DSP filters

MFJ-784
$219.95

MFJ's *super* DSP filter

automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite -- nearly any mode you'll ever encounter.

You get MFJ's *tunable* FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 60 dB attenuation just 75 Hz away.

***Only* MFJ gives you *5 tunable* DSP filters. You can *tune* each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

You get MFJ's *automatic notch filter* that searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like a local FM repeater.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable and pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fading.**

Automatic notch filter

MFJ's *automatic* notch filter searches for and eliminates *multiple* heterodynes. It's *milli*-second fast -- interfering CW and RTTY signals are also eliminated.

Voice signals aren't degraded because the notch is *extremely* narrow.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes, miss fewer calls and be less exhausted.

Leave the *automatic* notch filter on during a phone contest and you'll never hear unwanted heterodynes of tuner-uppers.

You can *selectively* remove tones. Say, you're on CW and a couple of annoying CW stations appear nearby. You can use the *two* manually *tunable* notch filters -- *an MFJ exclusive* -- to completely knock them out.

Adaptive noise reduction

Turning on *noise reduction* silences background noise. Noisy SSB, FM, AM, CW and Data signals become readable.

Noise reduction works in all filter modes and on all random noise -- white noise, impulse noise, static, ignition noise, power line noise, hiss and atmospheric noise.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

Reducing random noise reduces fatigue, especially when the band is noisy.

Tunable highpass/lowpass filters

For Voice and Data, nothing beats MFJ's exclusive *tunable* highpass/lowpass FIR linear phase "brick wall" filters.

You can *tune* the lower cutoff frequency 200 to 2200 HZ and the upper cutoff frequency 1400 to 3400 Hz.

Signals *just 75 Hz* away literally disappear -- they are reduced a *thousand* times, 60 dB!

Unlike other filters, speech clarity is not reduced by envelope distortion caused by unequal time delay.

By adjusting the highpass and lowpass filters you can create *custom* filters for Voice, Data and other modes.

When signals are weak, you can improve copy by removing high and low speech frequencies. They contain little information but are full of noise that reduce readability.

On crowded HF bands, overlapping SSB signals make copying difficult. You can improve copy by slicing off some overlap with razor sharp "brick wall" responses.

You can also highpass filter out hum, pulses, rasp and other irritating low frequency noise.

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in an MFJ *tunable* FIR bandpass filters.

You can *tune* the center frequency from 300 to 3400 Hz. And *vary* the bandwidth from 30 Hz to 2100 Hz -- from super tight CW filters to wide razor-sharp Data filters.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 50 dB.

You can use *narrower* bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth, you'll never have a problem with ringing.

One position gives you *two* tunable filters you can use together on one signal. For example, on RTTY, tune one filter to mark, the other to space and set the bandwidth tight for an incredibly sharp RTTY filter.

15 *pre-set* filters -- use factory set or program your own

You can select from *fifteen* convenient *pre-set* filters. Use them for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode you can think of.

If you don't like our *pre-set* filters, you can program your own -- *an MFJ exclusive!* Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch and noise reduction --all filter settings-- in 10 *programmable* filters.

Only MFJ gives you the best of both worlds -- *tunable* filters to eliminate nearly any QRM and fast convenient *pre-set* filters customized for any mode.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

Built-in two watt amplifier. Has volume control, input level control, speaker jack, headphone jack, accessory jack, PTT line and PTT sense and line level output. 9x2½x6 in.

It plugs between your transceiver or receiver and external speaker or headphones. Use 12 VDC or 110 VAC with MFJ-1315, $14.95.

No Matter What™ guarantee

You get MFJ's famous one year No Matter What™ *unconditional* guarantee. That means we will repair or replace (at our option) your MFJ-784 *no matter what* for a full year.

Call your dealer for your *best* price

Automatically eliminate heterodynes, reduce noise and QRM on Voice, CW and Data. Call your favorite dealer for your *best* price and order your MFJ *super* DSP filter today!

Free MFJ Catalog
Write or call toll-free . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
Technical Help: 800-647-TECH (8324)

• 1 year *unconditional* guarantee • 30 day money back guarantee (less s/h) on orders from MFJ • ***Free*** catalog

MFJ ENTERPRISES, INC.
Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST, Mon-Fri
FAX: (601) 323-6551; **Add $8 s/h**

Prices and specifications subject to change © *1994 MFJ Enterprises, Inc.*

MFJ . . . making quality affordable

CIRCLE 86 ON READER SERVICE CARD

Number 13 on your Feedback card

CARR'S CORNER

Joseph J. Carr K4IPV
P.O. Box 1099
Falls Church, VA 22041

Problems Running Your Ham Radio MS-DOS Software On That Snazzy New Windows Machine? Here's a Solution

There's an awful lot of software available for ham radio and general electronic hobbiest use, and much of it is written for MS-DOS machines. Normally, MS-DOS software runs fine on Windows machines, but sometimes you will see an error pop up that reads something to the effect of "Out of Memory Error" (or something similar—I've seen a couple variants). The error might occur on INSTALL, or when attempting to run the program.

When I saw that while trying to load one of my wife's MIDI musical notation programs on my new 486 machine, I about had a fit: "Whadya mean, 'Out of Memory'? I've got 16 whopping megabytes!" Unfortunately, the DOS core of my 486 machine still thinks it's in a 640K world. When I ran CHKDSK, the report on the screen showed that there was not enough memory left in my lower 640K to run, or even install, the program.

The problem is that memory in the lower 640K gets chewed up as you add features to the computer. Mine has a mouse, a CD-ROM drive, and a few software packages that all take up a little space in the lower 640K. As the Windows computer becomes more sophisticated, the more likely it is to go "tilt" when attempting to install a new MS-DOS program.

Fortunately, there's a workaround that should keep the software up and running until the S/W maker decides to release a Windows version. A call to the musical notation program people revealed the trick. The idea is to create new CONFIG.SYS and AUTOEXEC.BAT files that can run the MS-DOS software without destroying the old files. When you wish to run the odd software, you use a little program to swap the two files (and after you are finished, swap 'em back!).

Before you do anything, however, save the CONFIG.SYS file in a "golden" (which means you don't touch it) file. Go to the DOS prompt (C:\) and type:

```
COPY CONFIG.SYS CONFIG.SAV
```

Next, save the CONFIG.SYS file to a new file, which you will modify. My wife's music program wants to use CONFIG.MPP, so I'll just ape them (you can make up a name to fit the name of the software you'll be running).

```
COPY CONFIG.SYS CONFIG.MPP
```

You can check the CONFIG.SYS or its clone CONFIG.MPP file by using EDLIN or any word processor that will read ASCII DOS text (which is about all of them). From the DOS prompt, type:

```
EDIT CONFIG.MPP
```

Or, use your word processor software to find the same file in the root directory (C:\CONFIG.MPP). For my machine, the CONFIG.SYS and unmodified CONFIG.MPP file looks like this:

```
LASTDRIVE=Z
DEVICE=C:\DOS\SETVER.EXE
FILES=40
DEVICE=C:\SB16\DRV\SBCD.SYS
/D:MSCD001 /P:220
DEVICE=C:\SB16\DRV\CSP.SYS
/P:220
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\ANSI.SYS
DOS=HIGH
STACKS=9,256
BUFFERS=10,0
SHELL=C:\DOS\COMMAND.COM
C:\DOS\  /p
DEVICE=C:\DEV\MTMCDAE.SYS
/D:MSCD002 /P:300 /A:0 /M:20
/T:5 /I:10
```

The manual for the software ought to say something about the minimum CONFIG.SYS file needed to run the software. For the program that I was installing for my wife, the desired CONFIG.SYS should have read something like:

```
FILES=20
DEVICE=C:\DOS\ANSI.SYS
BUFFERS=20
```

They also told me that I should leave in any line that looked anything like:

```
SHELL=C:\DOS\COMMAND.COM
C:\DOS\  /p
```

The next step was to cut out anything in CONFIG.MPP (copied from CONFIG.SYS) that isn't needed. If the FILES and BUFFERS statement has a higher number than 20, then leave it (it is a minimum number). My final version of CONFIG.MPP looked like:

```
FILES=40
DEVICE=C:\DOS\ANSI.SYS
BUFFERS=20
SHELL=C:\DOS\COMMAND.COM
C:\DOS\  /p
```

You may also have to alter your AUTOEXEC.BAT file. This file is examined when the computer is booted up, and it determines whether or not any programs need to be run. Go to the DOS prompt (C:\) and type:

```
COPY  AUTOEXEC.BAT  AUTOEXEC.
SAV
```

and, then:

```
COPY  AUTOEXEC.BAT  AUTOEXEC.
MPP
```

Next, call up AUTOEXEC.MPP on either EDLIN or the wordprocessor. Mine looked like this:

```
C:\BIN\MSCDEX.EXE /D:MSCD003
/D:MSCD002 /D:MSCD001 /M:10
SET SOUND=C:\SB16
SET BLASTER=A220 I5 D1 H5
P330 T6
REM ** C:\DOS\MSCDEX.EXE
/D:MSCD001 /V /M:15
C:\SB16\SB16SET     /M:220
/VOC:220 /CD:220 /MIDI:220
/LINE:220
/TREBLE:0
C:\SB16\SBCONFIG.EXE /S
C:\DOS\SMARTDRV.EXE
ROMPT $P$G
PATH C:\DOS;C:\EXCELL;C:\EX-
CEL;C:\WINDOWS;C:\WP51\;C:\W
INWORD
REM***MOUSEWARE 6.10 SETUP***
PATH  C:\DOS;C:\EXCEL;C:\
MOUSE;%PATH%;C:\WINWORD
SET GMKW5=C:\WORDPERFECT
MOUSE CENHANCE SER 2
REM ************************
SET TEMP=C:\DOS
```

For now, you may not have to do anything, but if the new MS-DOS program fails to run, then you'll need to start removing some things (from AUTOEXEX.MPP, not, repeat *not*, AUTOEXEC.BAT or AUTOEXEC.MPP!).

You also need to create two new batch files: SETMPP.BAT swaps CON-

Sell your product in *73 Amateur Radio Today*
Call Dan Harper today. . . **1-800-274-7373**

Factory Authorized Dealer & Service For
KENWOOD
YAESU
ICOM
Call Us For Great Prices & Great Service
TOLL FREE ORDER LINE 1-800-344-3144
Continental U.S. & Texas
COMM, INC. THE HAM CENTER SAN ANTONIO TEXAS
SALES AMATEUR RADIO SERVICE
5730 Mobud San Antonio, TX 78238 (512) 680-6110
FAX (512) 647-8007

HI-PERFORMANCE DIPOLES
Antennas that work! Custom assembled to your center freq. ea. band - advise ht. of center and each end - hang as inverted "V" -horizontal, vert. dipole, sloping dipole - commercial quality - stainless hardware - legal power - no-trap, high-efficiency design. Personal check, MO or C.O.D. ($3.00)
MPD-5' 80, 40, 20, 15, 10M Max-Performance Dipole 87' or78' long.....$110.00
MPD-2' 80, 40M Max-Performance Dipole 85' long....$65.00 105' long.....$72.00
MPD-3712 30, 17, 12M Max-Performance Dipole, 31' long.....$73.00
HPD-3' 160, 80 40M i-Performance Dipole, soloct 113' or 125'.....$83.00
SSD-6 160, 80, 40, 20, 15, 10M Space-Saver Dipole 71' long.....$146.00
SSD-5* 80, 40, 20, 15, 10M 42' long.....$110.00 60'long.....$114.00
*Tunes 9 Bands with Wide-Matching-Range Tuner.....S&H per Antenna $6.00
$.52 SASE for catalog of 30 dipoles, slopers, & unique antennas
WSINN ANTENNAS
Box 393 Mt. Prospect IL 60056 708-394-3414
CIRCLE 38 ON READER SERVICE CARD

QUICK, EASY, & COMPACT
Flash cards "NOVICE thru EXTRA" theory Key words underlined. Over 4000 sets in use! For beginner, OMs, XYLs & kids.
NOVICE $11.95
TECHICIAN $10.95
GENERAL $8.95
ADVANCED $15.95
EXTRAS $14.95
Shipping 1-$3.00
2 or more -$4.00
CLUB DISCOUNTS
Order Today! from
VIS STUDY CARDS
P.O. BOX 17377
HATTIESBURG, MS 39404
CIRCLE 104 ON READER SERVICE CARD

Affordable PLASTIC **COAX-SEAL** "The Original Connector Sealant!"
SEALS COAX FITTINGS FROM MOISTURE AND CORROSION!
The Only Material That Will Adhere to Polyvinyl or Vinyl Outer Coax Jackets!
- Forms around and seals odd-shaped fittings.
- Non-contaminating and non-conductive.
- Wide ambient temperature range (-30° F to +180° F).
- Stays flexible for years insuring moisture-proof connections.
- Reusable—quick disconnection and resealing with same material.
- A must for satellite TV—microwave work.
- Hundreds of uses.
- Moistureproofs all connections.

WRAP
MOLD
COAX-SEAL . . . This space-age material is simple to apply. Remove 6" of plastic. Wrap to cover toward fitting. After wrapping, mold to form a smooth surface and force out air.
EFFECTIVE MOISTUREPROOF INEXPENSIVE

EVERY LNB AND COAXIAL CONNECTOR NEEDS COAX-SEAL
Trial packet for 4 connectors - $1.00 ppd.
UNIVERSAL ELECTRONICS, INC.
4555 Groves Road, Suite 12 Columbus, OH 43232
Phone (614) 866-4605 • FAX (614) 866-1201
CIRCLE 32 ON READER SERVICE CARD

FIG.MPP to CONFIG.SYS, while SETNORM.BAT swaps CONFIG.SAV (which was the original CONFIG.SYS file, if you will recall). These can be created on your wordprocessor software, and then stored as ASCII (DOS TEXT) in the root directory. The routine to make CONFIG.MPP the active CONFIG.SYS is:

```
C:
CD
COPY config.mpp config.sys
COPY          autoexec.mpp
autoexec.bat
ECHO {{PROGRAM NAME}} Configuration READY!
ECHO Please reboot computer:
Press CTRL/ALT/DEL
PAUSE
```

The line {{PROGRAM NAME}} should be replaced with the name of the program you want to run, or something that lets you know what was done. Once done, save this line as SETMPP.BAT in ASCII/DOS TEXT.

The function of this simple program is to copy the .MPP version of the configuration file to CONFIG.SYS, and the AUTOEXEC.MPP to AUTOEXEC.BAT.

Next, you need to write the program that will replace the old CONFIG.SYS file back in place (remember, this is now called CONFIG.SAV). Write the following using the wordprocessor:

```
C:
CD
COPY config.sav config.sys
COPY          autoexec.sav
autoexec.bat
ECHO Regular Configuration
READY
ECHO Please Reboot Computer:
Press CTRL\ALT\DEL
PAUSE
```

And save this program as SETNORM.BAT (again, save it in ASCII/DOS TEXT). The purpose of this program is to undo what the other program did. This configuration makes the computer think it's your Windows machine again.

Next, reboot your computer, and get to the DOS prompt (C:\>). Rebooting can be done by simultaneously pressing the CTRL/ALT/DEL keys. After all the turn on verbiage passes, type:

```
SETMPP
```

And then press <ENTER>.

The program will swap the .MPP versions into CONFIG.SYS and AUTOEXEC.BAT. Now you can try to install the new MS-DOS program. If the new program installs and runs, then no further adjustment is needed. However, if you still get the Out of Memory error, then (from DOS prompt) type:

```
SETNORM
```

Press <ENTER> and reboot the computer (CTRL/ALT/DEL). Get to your wordprocessor, and call up AUTOEXEC.MPP. Edit it to remove unwanted items. Start eliminating anything that isn't a Prompt, Path or Mouse line. I removed each item in turn until the INSTALL program ran. After each deletion, save the AUTOEXEC.MPP file and try again: From DOS prompt run SETMPP and reboot. If the program installs, you are home free. Otherwise, go back and try eliminating other lines from AUTOEXEC.MPP.

Remember, each time that you need to run the MS-DOS software that tilts your machine with an Out of Memory Error, you will have to run SETMPP from the DOS prompt (NOT from the Windows DOS prompt—Exit Windows if your machine automatically starts Windows on turn/on) and then reboot by pressing CTRL/ALT/DEL. When you finish using the MS-DOS software, then you will have to run SETNORM and then reboot (CTRL/ALT/DEL) to restore the original configuration file.

Conclusion

This solution to the problem is workable (although I wish that the software writers would write Windows versions of their product!). Someone with more computer smarts than me can probably give us a better solution (I'd like to hear from you, if you do). However, it does work. Since the MusicPrinter Plus help line people pointed out this solution in their user's manual (which I should've read), I've used it for a filter design program that will soon be reviewed in this column, and for the software the accompanies a distance learning course in economics that I am taking. Readers can reach me at P.O. Box 1099, Falls Church, VA, 22041.

OOPS!

Last month we inadvertently forgot to include this special offer from Kenwood.

99¢

for a DELUXE CORDURA SOFT CASE with purchase of a TH-79A, now through Dec. 31, 1994

See Kenwood dealer for details

Serving the LORD Since 1987

$49.95!

THE POWER STATION

The POWER STATION is a 12V x 7 AmpHr gel-cell battery complete with voltmeter, wall charger and a cord for charging via automobiles. It will power most HT's at 5 Watts for 2-4 weeks (depending upon how long-winded you are). Also VHF, UHF, QRP, or HF mobiles such as the KENWOOD TS-50 (at 50W). There are no hidden costs, all you need is your mobile, HT power cord or cigarette lighter adapter.

The POWER STATION provides 12V from a cigarette plug and has two recessed terminals for hardwiring. A mini-phone jack with regulated 3V, 6V, or 9V output can be used separately for CD players, Walkmans, etc. THE POWER STATION can be charged in an automobile in only 3 hours, or in the home in 8 hours. The charger will automatically shut off when the battery is completely charged, so you can charge it even when it has only been slightly discharged, (unlike Ni-Cads that have memory). Our charging circuit uses voltage sensing circuitry, other brands are timed chargers which always charge the battery a full cycle, this damages their battery and shortens its' life if it only needs a partial charge. The POWER STATION has a voltmeter that shows the exact state of charge of the battery, not worthless idiot lights that tell you "YOUR BATTERY IS NOW DEAD." The voltmeter can even be used to measure voltages of other sources.

To order, send check or money order for $49.95 + $8.50 for shipping, along with your shipping address and telephone number to:

Guaranteed Best Prices

Joe Brancato
THE HAM CONTACT
P.O. Box 3624, Dept. 73
Long Beach, CA 90803.

CA Residents Add 8 1/4% Sales Tax. Alaska, Hawaii, and Candian Residents, please send U.S. Money Order & $17.10 Shipping.

If you wish more information please send a SASE to the above Address. For COD orders, call (310) 433-5860, outside of CA Orders only call (800) 933-HAM4 and leave a message. *Dealer Inquires Invited.*

CIRCLE 384 ON READER SERVICE CARD

1994 Annual Index

Subject/Article	Description	Author	Issue	Page
Amplifiers, Audio, Preamp				
2m Half-Kilowatt for $1 per Watt	VHF amp/construction	WB2WIK/6	APR	40
Bridge amplifier	How-to	K4IPV	FEB	62
Coleman (Mini)-Kilowatt	Construction	WB2WIK/6	AUG	53
Microwave: log amplifiers	Construction	WB6IGP	MAR	74
Preamplifiers, microwave	Construction	WB6IGP	FEB	74
Single-band wideband receiver preamps	General info	K4IPV	DEC	54
Ten-Tec Argosy	QRP	WB8VGE	JAN	68
Antennas				
40 Meter Full-Wave Horizontal Loop	Construction	NH6XK	APR	14
440-450 MHz Omnidirectional Antenna	Construction	KAØNAN	NOV	22
ATV	Hog fence antenna	WB8ELK	NOV	63
Big Kahuna	Construction/twisted loop	WA6QBU	APR	20
Capacity Tuned Folded Loop	Construction	WA6QBU	OCT	38
Compact 160 Meter Transmitting Loop Antenna	Construction	G2BZQ	SEP	10
Design and Build a Dummy Antenna	Construction	VE5ZE	AUG	30
Folding 3-Element 2m Quad	Construction	WX8G	FEB	46
Foxcopter	RDF antenna	KØV	MAR	60
"Hula Loop"	Construction	NH6XK	JAN	30
Improved Resonant Feedline Dipole	Construction	W2OZH	JUL	44
Lightweight HF Ham Whips	How-to	WB6NOA	JUN	28
Loop antenna	Construction	K4IPV	NOV	50
Low-Cost Transmission Line	General Info	K5DKZ	SEP	22
Multiband Half-wave Delta Loop (MHDL)	Construction	WA6QBU	JUL	42
Novel Dual-Band, Single Feedline, VHF/UHF Antenna	Construction	W7KOH	AUG	26
Stretched Vertical Gain Antenna for 6 Meters	Construction	WB2EQG	DEC	30
The Discriminator	Construction	GB2ZQ	SEP	16
VHF Meteor Scatter Propagation	Description	WB2WIK/6	FEB	10
ATV, FSTV, SSTV, Video				
ATV	ATCO repeater system	WB8ELK	MAR	70
ATV	Big Shanty Repeater Group	WB8ELK	SEP	62
ATV	Birthday party	WB8ELK	MAY	78
ATV	Company listing	WB8ELK	DEC	56
ATV	DX	WB8ELK	OCT	62
ATV	Hog fence antenna	WB8ELK	NOV	63
ATV	Monterey Winterfest	WB8ELK	APR	80
ATV	Repeaters	WB8ELK	JAN	72
ATV	Rocket City	WB8ELK	JUN	64
ATV	W4HTM Repeater	WB8ELK	JUL	62
World's Smallest 10 GHz ATV Transmitter	Construction	HB9SLV; HB9RKR	JUL	16
Computers and Software—*See Microprocessors, Computers and Software*				
Digital Modes: Packet, CW, RTTY, AMTOR, etc.				
Adapting Bell 202 Telephone Modems for Packet	Construction	KI5PG	NOV	42
Computer-Control DDS VFO	Construction	VE1ABC	FEB	26
Choosing a computer	Tutorial	KB1UM	NOV	70
CW Operator's Friend	Construction	WV5Q	DEC	36
Digital Satellites	General info	WA5ZIB	JUL	50
HI-PER Audio Filter	CW filtering	KC3ZQ	MAY	10
Micro IDer	Construction	KA9SZW, Pointer	JAN	18
Morse Messenger	Construction/CW IDer	KF7VS	JUN	46
Packet	Choosing a computer	N1EWO	OCT	61
Packet	Computers/general info	N1EWO	SEP	61
Packet	General info	N1EWO	DEC	52
Packet	Navigation & networking/ RDF, General info	KØOV	OCT	56
Packet	SMTP tutorial	N1EWO	AUG	68
Packet	TCP/IP tutorial, part 4	N1EWO	JAN	70
Packet	TCP/IP tutorial, part 5	N1EWO	FEB	72
Packet	TCP/IP tutorial, part 6	N1EWO	MAR	68
Packet	TCP/IP tutorial, part 7	N1EWO	MAY	77
Packet	TCP/IP tutorial, JNOS	N1EWO	APR	78
Packet	TCP/IP tutorial	N1EWO	JUL	58
RTTY	AEA CP-1 computer patch interface	WA3AJR	APR	62
RTTY	Delphi group	WA3AJR	JUN	54
RTTY	General info	WA3AJR	AUG	58
RTTY	Interfaces, software	WA3AJR	MAY	65
RTTY	Microprocessors, general help	WA3AJR	JAN	52
RTTY	Software	WA3AJR	MAR	57
RTTY	Software	WA3AJR	SEP	48
RTTY	Software	WA3AJR	OCT	44
RTTY	Software	WA3AJR	FEB	60
RTTY	Software	WA3AJR	JUL	49
RTTY/packet	Software	WA3AJR	DEC	50
Stand-Alone DDS	Construction	VA3BH	AUG	10
TW-1 Cheap Digital Front Panel	Construction	N9JZW	MAR	26
Direction Finding				
10 GHz Operation & Loran	Microwave	WB6IGP	AUG	72
Attenuators	Construction	KØV	JUL	60
Australia	Foxhunting	KØOV	DEC	62
Folding 3-Element 2m Quad	Construction	WX8G	FEB	46
Foxcopter	Antenna	KØOV	MAR	60
FOXBOX	T-hunt controller/construction	KI5GH	MAR	42
General info	Miscellaneous	KØOV	FEB	65
Loran Operation	Microwave/general info	WB6IGP	SEP	64
Micro IDer	Construction	KA9SZW, Pointer	JAN	18
Morse Messenger	Construction/CW IDer	KF7VS	JUN	46
Motron's Transmitter Fingerprinter	Transmission IDer	KØOV	NOV	58
Navigation and networking via packet	General info	KØOV	OCT	56
NAVSTAR	Global positioning system	WA4BLC	JUL	10
RACES	General info	KØOV	SEP	56
Ramsey	SlyFox	KØOV	AUG	69
Rescue	Description	KØOV	APR	70
Sierra Leone	Foxhunting	KØOV	JUN	58
Techniques	Contesting	KØOV	JAN	62
Temblor T-hunt	General info	KØOV	MAY	70
General Interest				
Commercial General Radiotelephone Operator License	How-to	WB6NOA	MAR	52
Dayton Youth Forum	General info	WB2MGP	SEP	54
DX	General info	K4IPV	SEP	50
Education	General info	WB2MGP	JUN	61
EMI/RFI Defense Strategies for Hams	General info	N7MGT	JUL	24
Geography resources	Education	WB2MGP	DEC	60
Instructors' Workshop	Description	WB2MGP	JAN	66
Instructors' Workshop	Description	WB2MGP	AUG	66
Memory	Education	WB2MGP	APR	74
Motorcycle Mobile!	Mobile VHF/UHF operation	KC6QJB	APR	10
NASA	Education/follow-up activities	WB2MGP	OCT	54
Navajo Indian Reservation	CQ All Schools net	WB2MGP	MAR	64
NAVSTAR	Global positioning system	WA4BLC	JUL	10
Morse code	Nonverbal communication/ education	WB2MGP	NOV	56
Radar Gun Reality	W. Ross Adey	K6UI, W2NSD/1	May	30
Self-Esteem	Education	WB2MGP	MAY	73
Space/education	Payload packaging	WB2MGP	FEB	68
VHF Meteor Scatter Propagation	Description	WB2WIK/6	FEB	10
Microprocessors, Computers and Software				
Adapting Bell 202 Telephone Modems for Packet	Construction	KI5PG	NOV	42
ASCII-to-Morse-Code Interface	Construction	KD1JV	FEB	36
Circuit design software for hams	General info	K4IPV	JUN	56
Choosing a computer	Tutorial	KB1UM	NOV	70
Computer-Control DDS VFO	Construction	VE1ABC	FEB	26
CW Operator's Friend	Construction	WV5Q	DEC	36
DTMF Computer Interface	Construction	K7CAH	DEC	42
Getting Started With Satellite Imagery	Software	KO4BD	MAR	10
Micro IDer	Construction	KA9SZW, Pointer	JAN	18
Mini-Joystick Scanning	Construction	WB2WPM	AUG	65
Packet	Choosing a computer	N1EWO	OCT	61
Packet	Computers/general info	N1EWO	SEP	61
Packet	General info	N1EWO	DEC	52
Packet	SMTP tutorial	N1EWO	AUG	68
Packet	TCP/IP tutorial, part 4	N1EWO	JAN	70
Packet	TCP/IP tutorial, part 5	N1EWO	FEB	72
Packet	TCP/IP tutorial, part 6	N1EWO	MAR	68
Packet	TCP/IP tutorial, part 7	N1EWO	MAY	77
Packet	TCP/IP tutorial, JNOS	N1EWO	APR	78
Packet	TCP/IP tutorial	N1EWO	JUL	58
RTTY	AEA CP-1 computer patch interface	WA3AJR	APR	62
RTTY	Delphi group	WA3AJR	JUN	54
RTTY	Operating systems	WA3AJR	JAN	52
RTTY	Software	WA3AJR	MAR	57
RTTY	Software	WA3AJR	SEP	48
RTTY	Software	WA3AJR	JUL	49
RTTY	Software	WA3AJR	OCT	44
RTTY/packet	Software	WA3AJR	DEC	50
"Spectra Plus"	Spectrum analyzer software	K4IPV	AUG	62
Stand-Alone DDS	Construction	VA3BH	AUG	10

UPDATES

Number 15 on your Feedback card

The Traveler

See the above-mentioned article (October, 1994, page 23). The telephone number for Dan's Small Parts that we printed was close, but no cigar. The correct number is (406) 543-2872. Also please note there are only a limited number of the MC3335P ICs still available from Dan's Small Parts. Should those run out, FAR Circuits has also come up with a slightly modified PC board to accomodate the popular MC3362 chip in place of IC2.

BACK ISSUES

Have you missed any of our exciting and informative issues of *73*?

If so, you may now order some of the issues you missed. Call Joyce at (800) 274-7373 for more information.

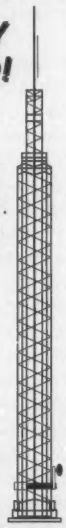
40th OUR YEAR!

A TRI-EX TOWER IS THE ONLY TOWER YOU WILL EVER NEED!

- **WT 51** ---------- *$1,050*
- **LM 354HD** -------- *$1,900*
- **LM470** ---------- *$3,658*

Designed to UBC 1991 - 70mph

CALL OR WRITE FOR A FREE CATALOGUE!



Tri-Ex®
TOWER CORPORATION
7182 Rasmussen Ave. • Visalia, CA 93291

Where engineering and quality come first!

TO ORDER CALL 800-328-2393
TECH SUPPORT 209-651-7859
FAX 209-651-5157

CIRCLE 22 ON READER SERVICE CARD

OWN THE WORLD'S BEST FOUR-WHEEL-DRIVE BASE STATION

Add a QMS Antenna Tuner System to your SSB.

$895.00

The QMS is an SGC Smartuner® automatic antenna coupler, an SG-303 extended full-range antenna, and the special exterior—waterproof— mounting package, all in one.

The QMS is that large box strapped to the side. We admit, at first glance it looks a little unusual. But once you use it, you'll find an almost unbelievable jump in reception and transmitting range (3-20 db). The QMS makes a typical HF-SSB perform like it's never performed before. Match it with a cutting edge SGC HF-SSB and it will blast holes through major mountain ranges and probably some laws of physics. Power and focus are everything in HF-SSB ham rigs. Buy this and own the best base station on–or off–the road.

Mounting the tuner and antenna on the outside reduces engine noise and eliminates power-draining antenna wire runs between the antenna and tuner.

QMS. It's the look of focused power.

LEARN TO LOVE THE LOOK

SMARTUNER INSIDE

SGC

NO-COMPROMISE COMMUNICATIONS

MADE IN USA

1-800-259-7331

The SGC Building P.O. Box 3526 Bellevue, WA 98009 USA (206) 746-6310 Fax: (206) 746-6384

CIRCLE 188 ON READER SERVICE CARD

Subject/Article	Description	Author	Issue	Page
Microwave/VHF/UHF				
10 GHz Operation & Loran	Construction	WB6IGP	AUG	72
2m Half-Kilowatt for $1 per Watt	VHF amp/construction	WB2WIK/6	APR	40
Constructing Hamtronics Modules	Kits; How-to	WB6IGP	MAY	80
Construction practices	How-to	WB6IGP	JAN	74
Converting HF SSB systems	Construction	WB6IGP	APR	82
Crystal oscillators and frequency standards	General info	WB6IGP	NOV	65
Frequency	General info/construction	WB6IGP	JUL	64
Log amplifiers, spectrum analyzers	Construction/how-to	WB6IGP	MAR	74
Loran Operation	General info	WB6IGP	SEP	64
Motorcycle Mobile!	Mobile VHF/UHF operation	KC6QJB	APR	10
Novel Dual-Band, Single Feedline, VHF/UHF Antenna	Construction	W7KOH	AUG	26
Preamplifiers	Construction	WB6IGP	FEB	74
SSB Operation	Construction	WB6IGP	JUN	66
Test equipment	Construction	WB6IGP	DEC	68
VHF Meteor Scatter Propagation	Description	WB2WIK/6	FEB	10
VHF/UHF frequency counters	General info	WB6IGP	OCT	64
Miscellaneous Circuits & Components				
Band-pass filters for receivers	K4IPV	OCT	46	
Bridge amplifier/Audio notch filter/ NiCd charging	Miscellaneous	K4IPV	FEB	62
Dumping interference	Wavetraps/Construction	K4IPV	JUL	52
HI-PER Audio Filter	CW filtering	KC3ZQ	MAY	10
Improved QRP Keying Circuit	Construction	KD1JV	MAY	58
Mobile-)N Alarm/Timer	Construction	KA8PHO	JUN	32
QRP	QSK module/HW-8,HW-9 modifications/construction	WB8VGE	OCT	50
Semiconductors—failures	Tutorial	KB1UM	MAY	84
Speech Compression	Monster mike/construction	KB1UM	MAY	16
Standardize Your Microphone Connectors	Construction	WB8YBM	FEB	44
Transistors	Tutorial	KB1UM	JAN	78
Universal VFO Project	How-to	K4IPV	MAY	66
New Products (by manufacturer)				
A & A Engineering	Weather Satellite Handbook Software	Staff	APR	96
Ace Communications	Trident HT	Staff	SEP	80
Aclypse Corporation	ADR-1 Robot Kit	Staff	JUL	82
AEA	DM-1 deviation meter	Staff	NOV	80
AEA	PK-12 packet controller	Staff	OCT	80
AEA	ST-1 Satellite Tracker	Staff	APR	96
AEA	WeFax 256 software	Staff	MAY	104
Amateur Radio Excellence	Classic Clock	Staff	AUG	90
Ameco Corp.	License manuals	Staff	FEB	86
AmSoft	"The World of Ham Radio"	Staff	MAR	88
Antenna Sales & Accessories	Fold-Over Model FO-1 adapter	Staff	SEP	80
Arrow Antenna	Fox Hunt Attenuator	Staff	JUN	88
Autek Research	RF Analyst	Staff	AUG	90
B+K Precision	Model 1688 power supply	Staff	MAY	104
B+K Precision	Model 2700 DMM	Staff	JUL	82
Cabin Flat Enterprises	T-shirts	Staff	DEC	80
Cable X-perts	LMR 400/600 cable	Staff	MAR	88
ComTrek	Windows program for KPC-3		NOV	80
Contact East	Catalog	Staff	MAY	104
Contact East	Catalog	Staff	OCT	80
Curry Communications	MKII Noise Annihilator	Staff	MAR	88
Davis Associates	Club Discount Catalog	Staff	JUN	88
Electronic Distributors Corp.	AR3030 receiver	Staff	JAN	88
Electrosoft	Software for Yaesu FT-990	Staff	AUG	90
FB Enterprises	Repeater maps	Staff	FEB	86
G4ZPY Paddle Keys International	Single-lever combo keyer	Staff	FEB	86
GAP Antenna Products	Titan DX antenna	Staff	SEP	80
Gordon West	Extra Class theory book	Staff	APR	96
Gordon West	General Class updated theory book	Staff	AUG	90
Hambrew	Magazine	Staff	FEB	86
Hamtronics	COR-6	Staff	JUL	82
Hamtronics	R138 receiver	Staff	NOV	80
Hamtronics	Repeater products	Staff	MAR	88
Highland Electronics	eBoard PC card	Staff	JAN	88
I.C. Engineering	DIGI-FIELD digital field strength meter	Staff	NOV	80
ICOM	IC-Delta transceiver	Staff	MAR	88
ICOM	IC-21H 2m mobile	Staff	OCT	80
ICOM	IC-2GXAT HT	Staff	APR	96
ICOM	IC-2700H mobile	Staff	SEP	80
ICOM	IC-T21A/T41A HTs	Staff	JUN	88
ICOM	IC-820H transceiver	Staff	AUG	90
Jade Products	Jade-Pole antennas	Staff	DEC	80
Jade Products	Lead-Acid/Gel-Cel Battery Charger Kits	Staff	JAN	88

A KEYNOTE SPEAKER *from Grove!*

Order SPK13

$249.95*

* Plus $7.50 UPS Ground Shipping

The Grove engineering team has created the most revolutionary audio accessory on the communication market: the SP200 Sound Enhancer.

Housed in a stylish, solid oak cabinet hand crafted in the mountains of North Carolina, , the SP200 is sure to enhance any radio room. The control panel, constructed of sturdy, black aluminum, has been designed for optimum ease and convenience when tuning and refining signals.

The SP200 combines a powerful audio amplifier, top-of-the-line speaker, and an adjustable filter system to create the most versatile listening environment ever available to radio enthusiasts. The keen peak/notch filter system and advanced noise limiter allow the listener to pull clear and distinct signals out of the haze of interference and background noise, while the adjustable bass and treble controls provide the flexibility to create just the sound you want. FSK, RTTY, packet, FAX, CW and all other data systems are enhanced while interference and electrical noise are reduced or even eliminated by the analog audio processor.

The SP200 also comes equipped with a stereo/mono headphone jack for private listening, and an automatic tape activator so that you never have to miss anything.

Try the new Grove SP200 Sound Enhancer with your receiver, scanner, or transceiver and enjoy the latest in speaker sophistication; you'll agree this is truly a keynote speaker!

SPECIFICATIONS:
Power Required: 12 to 14 VDC @500 mA; 120 VAC adaptor incl.
Audio Power Output: 2 W @ 10% THD (8 ohms)
Audio Selectivity: Peak/notch 30 dB or greater, 0.3-6 kHz
Squelch Hold: 0-10 seconds
Noise Limiter: Adjustable-threshold pulse noise clamp
Tape Activator: Audio activated (VOX), 3 second hold
Tape Output: 500 mV P-P @ 600 ohms (nom.)
Headphone Jack: Universal mono-wired stereo jack
Dimensions: 10-7/8"W x 6-7/8"H x 7-1/4"D

Why pay over $400 for these separate accessories:

→Speaker
→Adjustable Filter
→Recorder Activator
→Audio Amplifier
→Audio Activated Squelch
→Noise Limiter

When you can have it all in the new Grove

SP-200
SOUND ENHANCER

CALL NOW!
(800) 438-8155
(704) 837-9200

GROVE ENTERPRISES
Changing the way you hear the world

CIRCLE 348 ON READER SERVICE CARD

Subject/Article	Description	Author	Issue	Page
Jan Crystals	TCXOs	Staff	NOV	80
Kangaroo Tabor Software	CAPMAN 2.0	Staff	JUL	82
Kenwood	TS-60S transceiver	Staff	APR	96
JPS Communications	NTR-1 audio processing unit	Staff	APR	96
Just Neon	Lighted callsigns	Staff	MAR	88
Kantronics	G-TOR	Staff	JUN	88
Kenwood	TH-22AT/TH42-AT HTs	Staff	JAN	88
Lightning Bolt Antennas	10-element quad antennas	Staff	NOV	80
Link Communications	RLC-3 repeater	Staff	DEC	80
MFJ Enterprises	MFJ-411 Morse Code Tutor	Staff	NOV	80
MFJ Enterprises	MFJ-8400K repeater monitor receiver kit	Staff	DEC	80
Micro-Ohm Measurements	Ohm extender	Staff	FEB	86
NCG Comet	HA-4S mobile antenna	Staff	SEP	80
NCG Comet	Power Pocket battery	Staff	OCT	80
NCG Comet	Speaker microphone	Staff	APR	96
Naval Electronics	PV-35R VHF linear amplifier	Staff	AUG	90
Novatech Instruments	Model DDS4 PC signal source PC card	Staff	OCT	80
Number One Systems	Filtech filter circuit software	Staff	OCT	80
Number One Systems	Z-MATCH software	Staff	MAY	104
OFS WeatherFAX	Weather satellite demodulator	Staff	SEP	80
Optopelectronics	Model DC440 decoder	Staff	FEB	86
Optoelectronics	Scout	Staff	DEC	80
Pacific Scientific	Redi-Line generators	Staff	JUL	82
Radio Devices	PC705 Revex power checker	Staff	DEC	80
RF Industries	Catalog	Staff	MAY	104
RF Industries	Gripper Nipper	Staff	MAR	88
RF Industries	Wall-plate system	Staff	JAN	88
R.L. Drake	SW8 receiver	Staff	JUN	88
SGC	SmartLock antenna controller	Staff	JAN	88
S & S Engineering	ARK 4	Staff	JUN	88
S & S Engineering	ARK 20 transceiver kit	Staff	FEB	86
S &S Engineering	PC1 programmable frequency counter	Staff	DEC	80
S-COM Industries	Repeater software	Staff	MAY	104
SGC	SmartPowerCube amplifier	Staff	SEP	80
Sealevel Systems	RS-232 interface card	Staff	JUN	88
SESCOM	RF shielded steel boxes	Staff	NOV	80
Sinclair Radio Labs	AMV-6A site monitor	Staff	JUL	82
Spectrum Electronic Products	HRC-10 repeater controller	Staff	JAN	88
Supercircuits	PC-10XS microvideo camers	Staff	APR	96
Techsonic	QRP transmitter kits	Staff	MAY	104

Subject/Article	Description	Author	Issue	Page
The Tool Resource	Hexacon HTR 3320 soldering station	Staff	OCT	80
Tiare Publications	*Low Power Communications, Volume 2*	Staff	JUL	82
Tripp Lite	ISOBAR UltraFax surge supressor	Staff	JAN	88
Tripp Lite	MasterTouch surge suppressor	Staff	OCT	80
Tripp lite	Power Miser monitor/surge suppressor	Staff	FEB	86
Unified Microsystems	Contest Card interface board	Staff	MAR	88
WA1FFL	Ladder-Loc	Staff	AUG	90
Power Supplies				
Building small DC power supplies, Part 2	How-to	K4IPV	JAN	54
Fast Carger	Construction	KN6PK	MAY	22
Microwave	Construction	WB6IGP	JAN	74
MRP4Solar Panel Control Circuit	Construction	WB8VGE	JUN	10
NiCd charging	How-to	K4IPV	FEB	62
Polarity Protection Plus	General info	K5DKZ	DEC	40
Quad Charger	Construction	K4GOK	JAN	34
Surplus Solar	How-to	N7MGT	JUN	18
Used Batteries for Ham Stations	How-to	N7MGT	JUN	22
Video-Charge Your HT	Construction	KB1UM	OCT	42
QRP				
Analog meter	Construction	WB8VGE	MAY	74
Argosy	Modifications	WB8VGE	AUG	60
Battle of the Monobanders	General info	WB8VGE	OCT	10
Build the Quickie Cheapie Tener	Construction	Veronese	OCT	36
Clubs	Listing	WB8VGE	DEC	56
Clubs/kits/contests	General info	WB8VGE	MAR	66
Handy Randy	QRP wire tuner/construction	W3RDF	OCT	34
HW-8 Handbook/Pacific Coast bicycle trail	General info	WB8VGE	JUN	62
HW-9 modification	Construction	WB8VGE	NOV	54
Improved QRP Keying Circuit	Construction	KD1JV	MAY	58
LCK-80 receiver	General info	WB8VGE	SEP	52
Modifications to MFJ rigs	Construction	WB8VGE	JUL	55
QSK module	Construction	WB8VGE	APR	76
QSK module/HW-8,HW-9 modifications	Construction	WB8VGE	OCT	50
Ten-Tec	Argosy	WB8VGE	JAN	68
Ten-Tec	Argosy	WB8VGE	FEB	70

Number 16 on your Feedback card

PC HF FACSIMILE 7.0 $99

Now under Windows or DOS

PC HF Facsimile is a simple, yet comprehensive shortwave fax system for the IBM PC and compatibles. It includes an FSK demodulator, advanced signal processing software, tutorial cassette, and complete reference manual. With your PC and SSB receiver getting FAX is a snap. Here are just some of the features:

- **Mouse or Menu Driven**
- **Unattended Operation**
- **Easy Tuning Oscilloscope**
- **Start/Stop Tone Recognition**
- **Up to 256 Levels**
- **Single Scan per Line with EMS Memory**
- **Programmable Colorization**
- **Brightness and Contrast Control**
- **Transmit Option Available**
- **Image Zoom, Scroll, Pan, Rotation**
- **Grayscale on all Popular Printers**
- **Worldwide Broadcast Schedule**
- **Worldwide Frequency Listing**
- **CGA,HGA,EGA,VGA & Super VGA**
- **Time Lapse Frame Looping**
- **Slide Shows**
- **Programmable IOC & Line Rates**
- **Image Cropping**
- **Automatic Radio Control**
- **NAVTEXT & RTTY Option Available**

Call or write for our free catalog of products. Visa & MasterCard welcome.

Software Systems Consulting
615 S. El Camino Real, San Clemente, CA 92672
Tel.(714) 498-5784 Fax.(714) 498-0568

CIRCLE 250 ON READER SERVICE CARD

DEALER DIRECTORY

NEW JERSEY
Lodi

North Jersey's newest Two Way Radio and Electronics Dealer is now open. Sales of Ham, Business, Marine and C.B. two way equipment as well as Scanners, Shortwave, Electronic Kits, Antennas, Books, Cable Boxes and more. Friendly service and low prices. **Advanced Specialties, 114 Essex Street, Lodi NJ 07644. (201) VHF-2067.**

NEW JERSEY
Park Ridge

North Jersey's oldest and finest Shortwave and Ham Radio Dealer. Three minutes from Garden State Pkwy and NY Thruway. Authorized Dealers for AEA, Alpha Delta, Diamond, ICOM, Japan Radio Company, Kenwood, Vectronics, Yaesu, Ham Sales, Lee WK2T. **GILFER SHORTWAVE, 52 Park Ave., Park Ridge NJ 07656. (201) 391-7887.**

NEW YORK
Manhattan

Manhattan's largest and only ham Radio Store, also full line of Business, Marine, Aviation, Shortwave Radios and Scanners, and Cellular Phones and Beepers. Large selection of Books, Antennas, Test Equipment, coaxial cable and parts. Full Service Repair Lab on premises. Our 44th Year...We carry all major lines: MOTOROLA, ICOM, KENWOOD, YAESU, BENDIX KING, ASTRON, AEA, SONY, PANASONIC, MFJ, CCTV CAMERAS AND MONITORS, BIRD WATTMETERS, FREQUENCY COUNTERS, SCANNERS, HYGAIN, VIBROPLEX, HEIL, CALLBOOK, ARRL OTHER PUBLICATIONS. Open 7 days M-F, 9-6 p.m.; Sat., 10-5 p.m., Sun. 11-4 p.m. We ship *Worldwide*. Call, Fax, or write for information and prices. Your one Source for HAM and Business Radios . . . **BARRY ELECTRONICS, 512 Broadway, New York NY 10012. (212) 925-7000. FAX (212) 925-7001.**

OHIO
Columbus

Central Ohio's full-line authorized dealer for Kenwood, ICOM, Yaesu, Alinco, Japan Radio, Standard, AEA, Cushcraft, Hustler, Diamond and MFJ. New and used equipment on display and operational in our new 10,000 sq. ft. facility. Large SWL Department too. **UNIVERSAL RADIO, 6830 Americana Pkwy., Reynoldsburg (Columbus) OH 43068. (614) 866-4267.**

PENNSYLVANIA
Trevose

Authorized factory sales and service. KENWOOD, ICOM, YAESU, featuring AMERITRON, B&W, MFJ, HYGAIN, KLM, CUSHCRAFT, HUSTLER, KANTRONICS, AEA, VIBROPLEX, HEIL, CALLBOOK, ARRL Publications, and much more. **HAMTRONICS, INC., 4033 Brownsville Road, Trevose PA 19047. (215) 357-1400. FAX (215) 355-8958. Sales Order 1-800-426-2820.** Circle Reader Service 298 for more information.

Dealers: Your company name and message can contain up to 50 words for as little as $420 yearly (prepaid), or $210 for six months (prepaid). No mention of mail-order business please. Directory text and payment must reach us 60 days in advance of publication. For example, advertising for the April '92 issue must be in our hands by February 1st. Mail to 73 Amateur Radio Today, 70 Rte. 202 N, Peterborough, NH 03458

Subject/Article	Description	Author	Issue	Page
Receivers				
Band-pass filters for receivers	General info	K4IPV	OCT	46
QRP	LCK-80	WB8VGE	SEP	52
Sensitive Bandspread SWL Receiver	Construction	XE2/KB6EPO	APR	32
The Traveler	Construction	K5WMS	OCT	14
Using the World's Most Accurate Frequency Standard, Part 1	Construction	K9EUI	JAN	10
Reviews (by manufacturer)				
A&A Engingeering	20 Meter QRP rig	WB8VGE	OCT	24
Alinco	DJ-G1T handheld	WB6NOA	NOV	28
Ameritron	ALS-500M HF amplifier	W6KOW	DEC	26
Azden Corp.	PCS-7500H transceiver	WB2WIK/6	AUG	22
Bencher, Inc.	Chrome straight key	WB6NOA	DEC	48
Bilal Company	Isotron 40	AH2AR/5	NOV	40
Computer Automation Technology	CAT1000 and CAT 300 Repeater Controllers	K1ZJH	SEP	26
Connect Systems	CS-800 full-duplex interconnect	N3KHM	MAR	34
Diamond Antenna Corporation	Diamond X2200A UHF/ VHF antenna	WB2WIK/6	APR	28
Drake	SW8 World Band Shortwave Receiver	WA4BLC	AUG	38
Electronic Switch Co.	HOFI Antenna Switch	WA4BLC	SEP	24
Ham Repair	"The Radio Doctor" video	WB6NOA	JAN	48
ICOM	IC-2iA micro HT	Staff	MAY	40
JPS Communications	NRF-7 audio filter	WB9RRT	AUG	42
Kenwood	TH-22AT HT	WB9RRT	DEC	22
Kenwood	TH-28A HT	WB2WIK/6	FEB	52
Kenwood	TS-60S	WB2WIK/6	NOV	14
LDG Electronics	Fox controller/CW IDer	K4CHE	JUL	34
Lightning Bolt Antennas	Lightning Bolt Quad	AC4HF	APR	24
MFJ Enterprises	MFJ-1786 Super Hi-Q Loop	AC4HF	NOV	36
MFJ Enterprises	MFJ-9420 QRP SSB station	K1ZJH	OCT	28
Midland International Corp.	Antenna Models 18-300, 18-325, 18-330B	KT2B	JUN	36
MXM	Simple transceiver kit	AC4HF	NOV	32
Number One Systems	EASY-PC Software	K4IPV	JAN	42
Oak Hills Research	Classic dual-band QRP kit	AC4HF; Wee	DEC	14
RAI Enterprises	Quickyagi Antenna Design Program	WB9RRT	APR	30
Rayovac	Renewal Battery	N7MGT	JUN	40
S & S Engineering	ARK-4 40m transceiver kit	WB8VGE	DEC	18
S & S Engineering	Frequency counter kit	WB8VGE	JUL	30
Shortwave Receiver	Drake SW8	WA4BLC	AUG	38
TechSonic Milliwatter	QRP transmitter	WB8VGE	OCT	30
Ten-Tec	Scout transceiver	WB8VGE	MAR	36
The Ham Contact	The Power Station	WA1RZW	MAY	57
XPERTEK Electronics	DVMS/1+ digital voice mail	WA4TEM	FEB	56
Yaesu	FT-11R mini HT	KB1UM	SEP	32
Reviews (by product)				
Antenna	Bilal Isotron 40	AH2AR/5	NOV	40
Antenna	Diamond Antenna X2200A UHF/VHF antenna	WB2WIK/6	APR	28
Antenna	Lightning Bolt Quad	AC4HF	APR	24
Antenna	MFJ-1786 Super Hi-Q Loop	AC4HF	NOV	36
Antenna	Midland International Corp. Models 18-300, 18-325, 18-330B	KT2B	JUN	36
Antenna switch	Elecctronic Switch Co.'s HOFI Switch	WA4BLC	SEP	24
Audio filter	JPS Communications NRF-7	WB9RRT	AUG	42
Battery	Rayovac	N7MGT	JUN	40
Digital voice mail	XPERTEK Electronics DVMS/ 1+ digital voice mail	WA4TEM	FEB	56
Dual-band QRP kit	Oak Hills Research Classic	AC4HF; Wee	DEC	14
Fox controller/CW IDer	LDG Electronics	K4CHE	JUL	34
Frequency counter kit	S & S Engineering	WB8VGE	JUL	30
Full-duplex interconnect	Connect Systems CS-800	N3KHM	MAR	34
HF amplifier	Ameritron's ALS-500M	W6KOW	DEC	26
HT	Alinco DJ-G1T	WB6NOA	NOV	28
HT	ICOM-737	Staff	MAY	40
HT	Kenwood TH-22AT	WB9RRT	DEC	22
HT	Kenwood TH-28A	WB2WIK/6	FEB	52
HT	Yaesu FT-11R	KB1UM	SEP	32
Power supply	The Ham Contact's Power Station	WA1RZW	MAY	57
QRP rig	A&A Engingeering	WB8VGE	OCT	24
QRP rig	MFJ-9420 QRP SSB station	K1ZJH	OCT	28
QRP transmitter	TechSonic Milliwatter	WB8VGE	OCT	30
Repeater Controllers	Computer Automation Technology's CAT1000 and CAT 300	K1ZJH	SEP	26
Software	Number One Systems EASY-PC Software	K4IPV	JAN	42
Software	RAI Enterprises Quickyagi Antenna Design Program	WB9RRT	APR	30
Straight key	Bencher, Inc.	WB6NOA	DEC	48
Transceiver	Kenwood TS-60S	WB2WIK/6	NOV	14
Transceiver	Azden Corp. PCS-7500H transceiver	WB2WIK/6	AUG	22
Transceiver	Ten-Tec Scout	WB8VGE	MAR	36
Transceiver kit	MXM single-band CW QRP	AC4HF	NOV	32
Transceiver kit	S & S Engineering's ARK-4	WB8VGE	DEC	18
Video—"The Radio Doctor"	Ham Repair	WB6NOA	JAN	48
Satellite Operation, EME, Space				
AMSAT Annual Meeting	Description	WA5ZIB	JAN	50
AMSAT Awards	Description	WA5ZIB	JUN	52
AMSAT Dayton '94	Description	WA5ZIB	SEP	46
Digital Satellites	General info	WA5ZIB	JUL	50
Education	Payload packaging	WB2MGP	FEB	68
Endeavour launch	General info	WB2MGP	JUL	54
Getting Started With Satellite Imagery	Software	KO4BD	MAR	10
NASA	Education/follow-up activities	WB2MGP	OCT	54
RS-10	General info	WA5ZIB	NOV	48
SAREX	General info	WA5ZIB	APR	58
Satellite Portable	General info	WA5ZIB	AUG	57
VHF Meteor Scatter Propagation	Description	WB2WIK/6	FEB	10
The Return of DOVE	General Info	WA5ZIB	MAY	60
Test Equipment				
Average and Peak Reading RF Peak Reading RF Power Meter	Construction	K4GOK	NOV	10
Crystal oscillators and frequency standards	Microwave/general info	WB6IGP	NOV	65
Construction	General info	KB1UM	SEP	68
Delayed Video Trigger for your Design and Build a Dummy Antenna	Construction	VE5ZE	AUG	30
Frequency counters	Tutorial	KB1UM	FEB	78
Handy Randy	QRP wire tuner/construction	W3RDF	OCT	34
Log amplifiers, spectrum analyzers	Construction/how-to	WB6IGP	MAR	74
Microwave	Signal generator/diode detector mount	WB6IGP	DEC	68
Microwave	VHF/UHF frequency counters General info	WB6IGP	OCT	64
Oscilloscope	Construction	KC3XM	JUL	38
"Spectra Plus"	Spectrum analyzer software	K4IPV	AUG	62
Using the World's Most Accurate Frequency Standard, Part 1	Construction	K9EUI	JAN	10
Using the World's Most Accurate Frequency Standard, Part 2	Construction	K9EUI	FEB	18
Using the World's Most Accurate Frequency Standard, Part 3	Construction	K9EUI	MAR	18
Universal VFO Project	How-to	K4IPV	MAY	66
Theory, Tips, Tutorials, How-To				
Adapters	Tutorial	KB1UM	APR	86
Choosing a computer	Tutorial	KB1UM	NOV	70
Circuit design/construction	Tutorial	KB1UM	SEP	68
Circuit design/construction	Tutorial	KB1UM	OCT	68
Clipping	General info	KB1UM	JUL	68
Commercial General Radiotelephone Operator License	How-to	WB6NOA	MAR	52
Frequency counters	Tutorial	KB1UM	FEB	78
Get the heat out!	Tutorial	K4IPV	APR	64
Ground loop	Tutorial	KB1UM	Mar	78
Intermittents	General info	KB1UM	AUG	76
Kit Builders' Primer	Tutorial	WB8VGE	DEC	10
Microwave	Construction practices	WB6IGP	JAN	74
QRH	General info	KB1UM	JUN	70
Repairing water-damaged ham gear	How-to	K4IPV	MAR	58
RTTY	General info	WA3AJR	AUG	58
Semiconductors—failures	Tutorial	KB1UM	MAY	84
"Spectra Plus"	Spectrum analyzer software	K4IPV	AUG	62
Speech Compression	Monster mike/construction	KB1UM	MAY	16
Universal VFO Project	How-to	K4IPV	MAY	66
Using International 9096-IIA	How-to	WB2WIK/6	APR	48
Transistors	Tutorial	KB1UM	JAN	78
Troubleshooting kits	Tutorial	KB1UM	DEC	72
Transceivers				
1750 Meters	Construction	WD4PLI/6	SEP	36
Battle of the Monobanders	General info	WB8VGE	OCT	10
Transmitters				
Build the Quickie Cheapie Tener	Construction/QRP	Veronese	OCT	36
Ramsey	SlyFox	KØOV	AUG	69
Updates				
ASCII-to-Morse-Code Interface	FEB '94 issue	KD1JV	APR	55
CAT 1000 and CAT 300 Repeater Controllers	SEPT '94 issue	K1ZJH	NOV	47
FARA Project	NOV '93 issue	A1GPO	JAN	53
Fast Charger	MAY '94 issue	KN6PK	AUG	76
Handy Randy	OCT '94 issue	W3RDF	NOV	47
HI-PER Audio Filter	MAY '94 issue	KC3ZQ	AUG	76
Homing In	JUL '94 issue	KØOV	SEP	59
Micro IDer	JAN '94 issue	KA9SZW, Pointer	MAR	83
Using the World's Most Accurate Frequency Standard	FEB & MAR '94 issues	K9EUI	MAY	47
Using the World's Most Accurate Frequency Standard	MAR '94 issue	K9EUI	JUN	41

CornerBeam?

SWR < 1.2:1 across the band
Gain of a 15 ft Yagi
No dimension over 7 ft
40 dB Front-to Back Ratio
60° Half-power Beamwidth
Mounts directly to mast
Vertical or Horizontal Polarization
2meters $145, 220 MHz $145, 70 cm $115, Dual 146/440 $165
Weighs only 10 lbs. Add $11 Shipping & Handling. Info $1.

AntennasWest
Box 50062 Provo UT 84605

Order HotLine
801 373 8425

CIRCLE 380 ON READER SERVICE CARD

Subscribe to
73 Amateur Radio Today
Call **800-289-0388**

C.P.I.

Dealers for Kenwood, Yaesu, Icom, Cushcraft, AEA, Kantronics, Bencher, Diamond, Astron, MFJ, Hustler, Ameritron, Larsen, ARRL, and more...
Service is also available.

Get your best price then call us LAST!!

(801) 567-9494 - (800) 942-8873
7946 South State Street
Midvale, UT 84047

CIRCLE 156 ON READER SERVICE CARD

Isn't Your Radio Worth The Investment?
Protect It With

THE PACK-IT
FROM TRANSEL TECHNOLOGIES
TRANSEL TECHNOLOGIES

Protect your HT's, Cellular Phones, Pagers, and any other devices you carry that may be subject to damage.

The PACK-IT is made of 1/4" neoprene material which is safety belt sewn to the nylon protective backing. The PACK-IT doesn't frey like many other materials and is safe to wash whenever needed.

The strap and 2" beltloop is made from commercial grade webbing and is secured in the front with a Velcro hook and loop assembly.

The PACK-IT doesn't wear the radio like leather and protects the radio from the small falls which occurs in everyday usage. The neoprene material is a cushion material which not only covers the radio but also protects it. Various sizes available so call for the size to fit your need.

Made In The USA!

$15.95 + $3.00 S&H
1 (800) 829-8321
Dealers Welcome

CIRCLE 11 ON READER SERVICE CARD

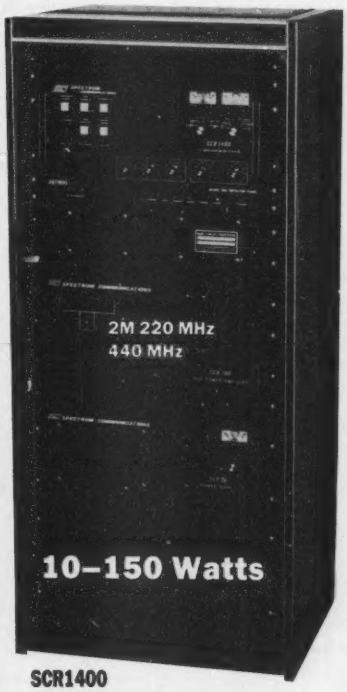
For High Performance in Repeater Technology, Go with the Leader—
SPECTRUM

S-7R Basic Repeater

NEW!

- **"Stand Alone" or use with your controller**

- **10–40 Watt Units**
- **2M, 222, 440 MHz**
- **Super Sensitive/Selective Receivers**
- **Unusually Good Repeat Audio**
- **Proven Performance throughout the World!**



SCR1400
REPEATER W/150 WT. 2M Amp & 30A POWER SUPPLY.
(All items available separately)

Shown in optional cabinet.

Call or write today for details and prices!
Get your order in A.S.A.P.
Sold Factory Direct or through Export Sales Reps. only.

For that new Machine—Spectrum makes 2 lines of Repeaters—the Deluxe SCR1400 and the new basic low cost S-7R line.

The S-7R Repeaters maintain the quality of design, components and construction which have made Spectrum gear famous *throughout* the world for years.

However, all of the "bells & whistles" have been eliminated—*at a large cost savings to you!* The S-7R is a real "work-horse" basic machine designed for those who want excellent, super-reliable performance—*but no frills!* For use as a complete "stand-alone" unit, or with a controller.

Of course, if you do want a Full Featured/Super Deluxe Repeater with Full panel metering and controls, and a complete list of 'built-in' options, then you want our SCR1400—the new successor to the "Industry Standard" SCR1000/4000.

Available with Autopatch/Reverse Patch/Landline Control; TouchTone Control of various repeater functions; 'PL'; "Emergency Pwr./ID; High/Low TX Power; Tone & Timer Units; Sharp RX Filters; Power Amps, etc.

■ **Complete Line of VHF/UHF Rcvr. & Xmtr. Link Boards & Assemblies also available. Plus ID, COR, DTMF Control Bds., Antennas, Duplexers, Cabinets, etc. Inquire.**

SPECTRUM COMMUNICATIONS CORP.

1055 W. Germantown Pk, S4 • Norristown, PA • (610) 631-1710 • FAX: (610) 631-5017

CIRCLE 51 ON READER SERVICE CARD

QRP

Number 17 on your Feedback card

Low Power Operation

Michael Bryce WB8VGE
2225 Mayflower NW
Massillon OH 44646

A new year brings new projects. This month I have some small projects to make those long winter nights more enjoyable.

MFJ Modification

The first project is a modification to the MFJ QRP transceivers. I've run several modifications to these rigs before, but this one looks like a real winner. As you might expect, it deals with the lackluster audio some of the early production models had. As usual, I've not had the time to install any of the following modifications. So, if you don't know what you're doing, by all means don't mess up the insides of your rig!

The modification shown in Figure 1 for the MFJ rigs comes from KB4ZGC. Most of the work centers on the addition of an audio preamplifier to the input of the LM386. Notice the volume control inserted between the product detector and the audio preamplifier. Also note, the LM386 is operating from the unregulated power side while the preamplifier is running from the 10.5+ regulated supply.

As a side note, I've been informed that MFJ is so far behind, as I write this, that there may be a wait for the rigs. Depending on what model you want, I've been told up to eight weeks' wait is possible. MFJ suggests contacting one of their larger dealers, as they will be getting their orders done first.

NorCal 40 Modification

The NorCal 40 has been an extremely popular little 40 meter rig. The NorCal 40 is tuned by a pot controlling a varactor diode. It's a nice way of tuning the rig, but deep down inside most of us, we want a variable capacitor. Figure 2 shows a circuit to replace the varactor diode with a capacitor. I think you'll find this circuit will work just fine in place of the varactor diode/pot. It's also great to have laying around in your files, too. The 40-40 uses the same type of tuning method as the NorCal 40 and you may be able to use this circuit, too.

Buck-Boost Regulator

OK, here's a strange one: How many times have you built a rig and then needed to add on a power supply? If you're like me and want to run the critter from a battery, there's usually a problem: The popular three-terminal voltage regulator ICs fall out of regulation when approaching their operating voltage. You can use one of the low-dropout regulators, but you're still limited to the voltage set by the regulator.

While working on another off-the-wall project, I came upon a slick circuit from Linear Technology (see Figure 3). It's known as a buck-boost regulator. Its input is from 8 volts to 40 volts. The output is set for 5 volts, but can easily be changed to 12 volts. The regulator will supply up to 5 amps of current. That's more than enough for us low-power freaks.

The converter is based on the Linear Technology LT1074 switching regulator IC. This device needs only a few external parts to make up a complete regulator, including thermal protection and current limiting. This design uses off-the-shelf parts for low cost, and easy availability of components. The LT1074 is available from Digi-Key.

Here's how it works: At intervals of 10 microseconds (100 kHz) the control portion of the LT1074 turns on the switch transistor between the Vin and Vsw points, impressing a voltage across the inductor, L1. This causes current to build up in the inductor, while also supplying current to the load and capacitor C1.

The control circuit determines when to turn off the switch during the 10 ms interval to keep the output voltage at the desired set point. When the switching transistor turns off, the magnetic field in the inductor collapses and the polarity of the voltage across the inductor changes to try and maintain the current in the inductor. This current in the inductor is now directed (due to the change in voltage polarity across the inductor) by diode D1, to the load. The current will flow from the inductor until the switch turns on again (continuous operation), or until the inductor runs out of energy (discontinuous operation). The divider circuit consisting of R1 and R2 is used to set the output voltage of the supply against an internal voltage reference of 2.21 VDC. Resistor R3 and capacitor C3 make up the frequency compensation network used to stabilize the feedback loop.

I plan on building up one of these regulators, but I have not had the time as yet. It's a simple circuit, as you can see. I feel this circuit has some merit in QRP. Many of the power FET amplifiers require a power supply of at least 24 volts. This switching regulator may be used to supply a second regulated voltage to the receiver, or low level transmit stages—all without the excess heat normally generated by a linear regulator.

My only concern would be the RF noise generated by the switching at 100 kHz. The high audio gain used in most direct conversion receivers might pick up the switching noise. This should be an interesting avenue to travel.

I would also try to reduce the size of the inductors. A 5 amp inductor is a formidable-sized critter.

That's it for this month. Since we have started a new year, next time we meet, I'll have something very different. After all, the next century is only only five years away. 73

See Figures 2 and 3 on page 58

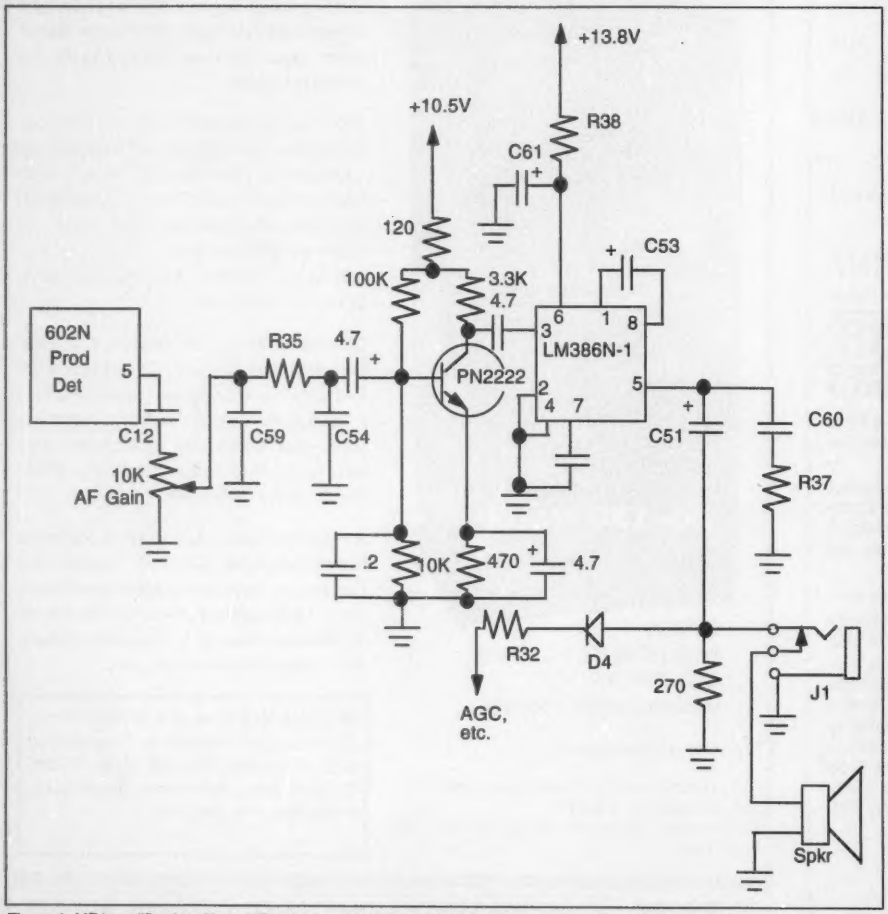


Figure 1. MFJ modification. Note: MFJ wired my 9020 LM-386N-L as shown, with signals fed to non-inverting input, an invitation to positive feedback. It should have been injected on pin 2! I installed AF preamp and changed the AF circuit as shown above. I have sufficient speaker audio, though the 386 is not driven nearly to its specified 250 mW. With no signal, a slight hiss can just be heard with AF gain put at 3 o'clock; very little full CW.

BUSINESS FOR SALE
OWNER RETIRING

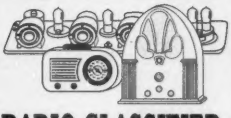
This small manufacturing business established in 1956 has shown a profit every year. Can be operated with just 2 employees or partners. Sales in 1993 $159,000. Can easily be doubled.

Complete manufacturing facilities from design to finished product. Adapts quickly to any new product. Replacement cost of equipment over $250,000. Sale price of business $150,000 includes everything except 2 story frame building which is available separately for only $140,000.

OPPORTUNITY OF A LIFETIME. DON'T MISS OUT.

Business continues to operate. Strong growing market for product line. Call of FAX the owner any Tuesday, Wednesday or Thursday at: **718-468-2720.**

FREE SAMPLE COPY!

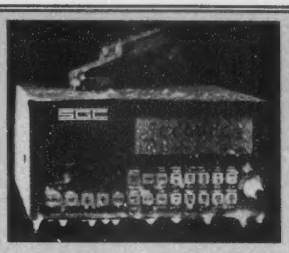


ANTIQUE RADIO CLASSIFIED

Antique Radio's Largest-Circulation Monthly Magazine

Articles - Classifieds - Ads for Parts & Services
Also: Early TV, Ham Equip., Books, Telegraph, 40's & 50's Radios & more...
Free 20-word ad each month. Don't miss out!
1-Year: $29.95 ($47.95 by 1st Class)
6-Month Trial - $16.95. Foreign - Write.
A.R.C., P.O. Box 802-E9, Carlisle, MA 01741
Or Call: (508) 371-0512

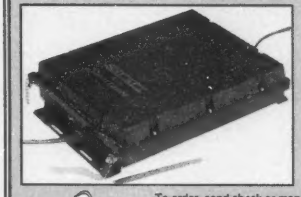
VISA



BUY AMERICAN, BETTER PRICE AND QUALITY

The SG2000 HF tranceiver is type accepted for commercial and marine service made with traditional U.S. commercial radio quality (and of course it can be used on the ham bands also). While the Japanese radios have 2 final transistors that strain to put out 100 watts on the low bands and only 75-85 watts on ten meters, the SG2000 has 4 large transistors that loaf along at 150 watts on ALL THE BANDS INCLUDING 10 METERS! Some of the SG2000 features are: 1) A control head remotable (no special kit necessary) up to 150' away from the rig, perfect for automobiles and boats. Up to 8 heads can be utilized and used as intercoms also. 2) The largest display of any HF transceiver. 3) 644 pre-programmed memories and 100 user programmable memories. 4) operable from -50F (-45C) to 185F (+85C). You want quality right? Here is what EVERY SG2000 must endure before they're shipped from the factory: 1) They're factory aligned, 2) EVERY SG2000 is keyed down at full power (CW 150 Watts) into an open antenna for about 10 seconds, then connected to a shorted antenna and keyed down for an additional 10 seconds. 3) EVERY SG2000 is put in the "BURN-IN" rack and keyed down for 24 hours non-stop at full power CW. Don't try that with the foreign radios. 4) EVERY SG2000 is then re-checked for alignment and put in the "TORTURE RACK" where they are keyed on and off every 10 seconds for 24 hours. 5) The SG2000 is then re-evaluated and all control functions are verified to ensure that the microprocessor is up to spec. THEN AND ONLY THEN IS THE SG2000 ALLOWED TO LEAVE THE FACTORY.

The bottom line is price, you know how expensive commercial rigs are normally, we are selling the SG2000 BELOW DEALER COST at only $1,585.00 each!! That's a $400.00 savings! We guarantee the best price.



The SG230 SMART-TUNER is the best HF autotuner at any price, and to promote a product that is made in the USA, we're offering it at the guaranteed best price of only $449.00!! WHY THE SG230? BECAUSE: When you tune an antenna at it's base you are resonating the antenna, instead of just matching the coax to the radio as with other tuners such as the AT50, etc. The result YOUR SIGNAL GETS OUT MUCH BETTER. The Kenwood AT50, AT450 and other similar tuners can only match 3:1 mismatches (YES only 3:1) so forget matching anything but a fairly decent antenna. The SG230 can match from 0.5 Ohm to 10 kilohm antennas (up to a 200:1 mismatch), so it can easily match random wires, dipoles, rain-gutters, shopping carts, etc. The result MORE POWER.

To order, send check or money order with $8.50 for shipping, along with your shipping address (sorry no U.S. Post Office Boxes, UPS will not deliver) and Telephone number to:

Guaranteed Best Prices

Joe Brancato
THE HAM CONTACT
PO Box 3624, Dept 73
Long Beach, CA 90803

CA Residents Add 8 1/4% Sales Tax. Alaska, Hawaii, and Canadian Residents please send U.S. Money Order + $17.10 for shipping.

Serving The LORD Since 1987

If you wish more information please send a SASE to the above address. For COD orders, call (310)433-5860, outside of CA **Orders Only** call **(800)933-HAM4** and leave a message.

CIRCLE 384 ON READER SERVICE CARD

Ever wish you had a radar gun in your car?

The *ZAPPER* is an awesome Answer!

This magic-like little box activates any radar detector within 3/4 of a mile. Watch the brake lights come on the speeding sports car that just flew by. Keep those speeding big trucks from eating your bumper. The ***ZAPPER*** is a10GHz amateur transmitter the size of a cigarette pack, operates on a 9v battery. Complete with road game "Trolling for Tailights".

Built & tuned only **$49.95** Plus $5.00 S&H

TRANSEL TECHNOLOGIES
MADE IN USA

123 East South Street
Harveys burg, Oh 45032
1-800-829-8321

CIRCLE 11 ON READER SERVICE CARD

High Power 12v Batteries

$40 Special To Charge You Up...

Periphex Power Packs for Longer QSO Time

replacements for	*regular price*
BP-85S ICOM 12v 800ma	$76.00
FNB-27 YAESU 12v 600ma	$60.00
EBP-22S ALINCO 12v 800ma	$65.00
PB-14S KENWOOD 12v 400ma	$60.00

Now Only $40 Each

- One Year Warranty
- Matched cell construction
- Case re-build service
- Long life, extended operating time

Buy your radio from the manufacturer. Buy the battery pack from Periphex— where batteries are our only business!

Add $4.00 Shipping & Handling for first battery.
$1.00 for each add'l battery - U.S. only
MA residents add 5% tax.

Available from your dealer...

PERIPHEX inc.

the only thing low about our charge is the cost...

1-800-634-8132

Periphex, Inc. • 300 Centre Street • Holbrook, MA 02343 • (617) 767-5516 • (617) 767-4599

CIRCLE 68 ON READER SERVICE CARD

Continued from page 56

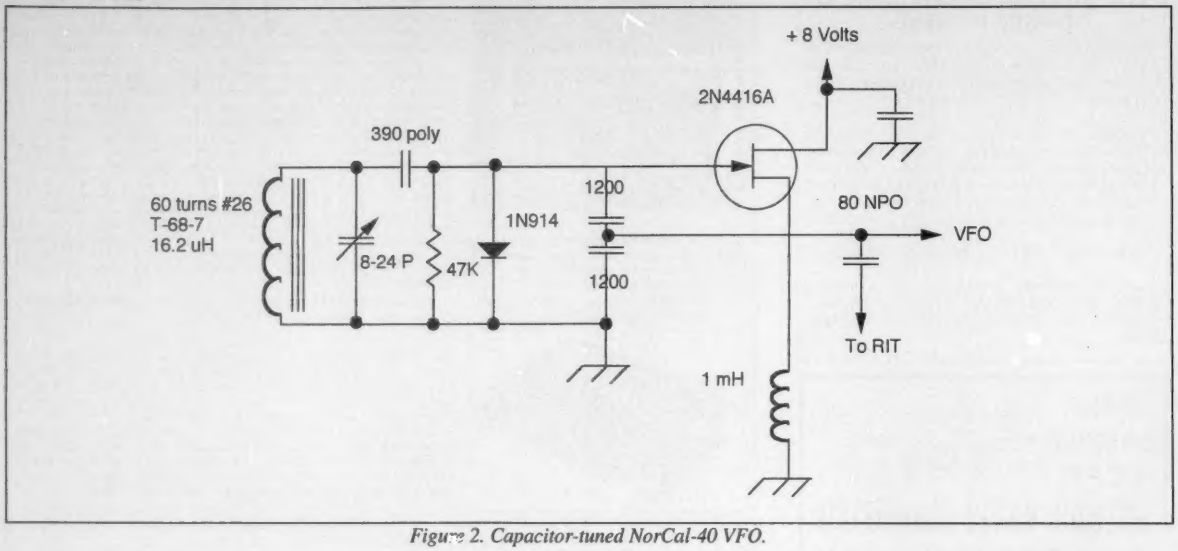


Figure 2. Capacitor-tuned NorCal-40 VFO.

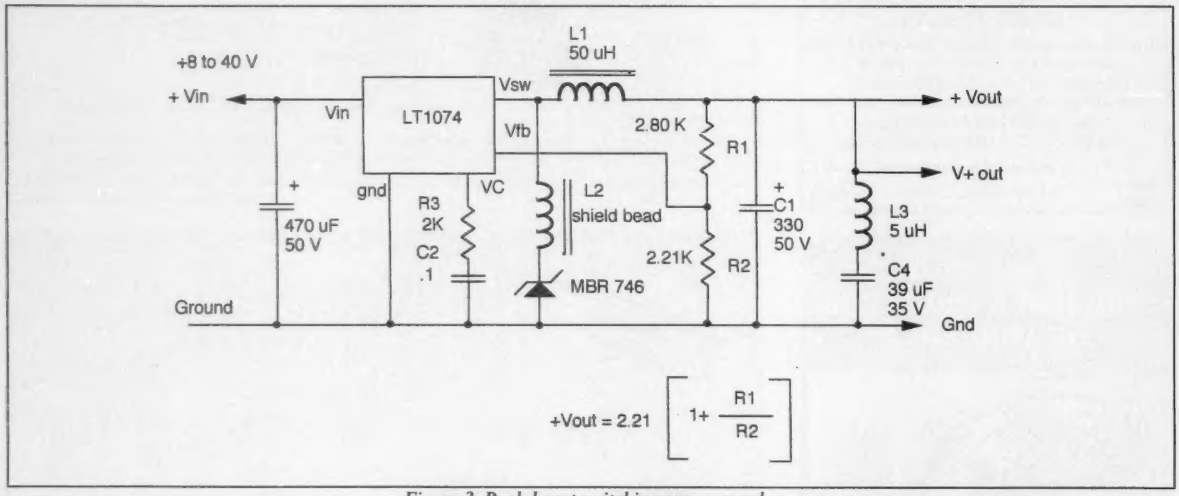


Figure 3. Buck-boost switching power supply.

For The Ultimate Shack!

100% made in the U.S.A.

Imagine your callsign on the *A.R.E.* Classic Clock!

- Beautiful, laminated original artwork.
- Quality quartz movement.
- Suitable for wall or desk (approx. 9"x9"x2").
- Runs on one AA battery (included).
- Only $39.99 (plus $4.50 shipping in U.S./foreign orders FPO New Hampshire).
- Specify callsign and choice of simulated walnut, light oak or black frame.
- Send check or money order to:

Amateur Radio Excellence
Box 1551•Manchester, NH•03105

Say You Saw It In
73 Amateur Radio Today

SPY ON THE EARTH

See *live* on your PC what satellites in orbit see

Capture *live* breathtaking images of the Earth for fun or profit. Zoom in up to 20X. Send $39 check or M.O. ($45 air, $50 overseas) for our *fantastic* 12 diskette set of professional quality copyrighted programs (IBM type) that does satellite tracking, image acquisition, image processing, 3-D projections and more. Direct reception from the satellites guaranteed worldwide without a satellite dish. Schematics included for interface. For FREE information log-on to our bulletin board anytime at: (718) 740-3911.

VANGUARD Electronic Labs
Dept. RF, 196-23 Jamaica Ave.
Hollis, NY 11423 Tel.718-468-2720

COLOR SLOW SCAN TV
for the
VISA **SOUND BLASTER** MasterCard

COLOR

SSTV

Now *send* and *receive* Slow Scan TV with your Sound Blaster compatible sound card in FULL COLOR!!! Easy and fun to use! Send your own pictures and Receive in Robot 8,12,24,36 B&W, Robot 36 & 72 COLOR and Scotty 1 & 2 in COLOR.

Requires PC, VGA 640 x 480 - 256 colors, and Sound Blaster compatible sound card.

ONLY $99.95

Shipping $5 - Overseas $10
Illinois residents add 6.25% tax

SLOW SCAN II $40.00
AUDIO ANALYZER $39.95

Harlan Technologies
5931 Alma Dr. - Rockford, Illinois 61108
Voice 815-398-2683
Fax 815-398-2688

CIRCLE 187 ON READER SERVICE CARD

C.W. WOLFE COMMUNICATIONS, INC.

★★★ **HELP US OUT SALE** ★★★

We're overstocked which means BIG savings on all our overstocked inventory — radios, reeds, elements, base cards.

WE BUY, SELL & TRADE ALL BRANDS OF 2-WAY RADIOS & ACCESSORIES

Call or write for our current flyer

406-252-9220 Fax **406-252-9617**

1113 Central, Billings, MT 59102

CIRCLE 20 ON READER SERVICE CARD

CABLE T.V. CONVERTERS

Jerrold™, Oak, Scientific Atlantic, Zenith, & many others. "New" MTS stereo add-on: mute & volume. Ideal for 400 & 450 owners.

1–800–826–7623

B & B INC.

3584 Kennebec, Eagan MN 55122

CIRCLE 21 ON READER SERVICE CARD

SELL YOUR PRODUCT IN *73 MAGAZINE*
CALL DAN HARPER **800-274-7373**

▼ *ELECTROMAGNETIC FIELD METER* ▼

Reduce exposure to potentially harmful electromagnetic fields. AlphaLab's handheld TriField™ Meter measures AC electric fields, AC magnetic fields *and* radio/microwave power density. Find ground faults, AC current wires or measure high-field generators with the *Magnetic* setting (.2 – 100 milligauss, 60 Hz); identify poorly grounded or shielded equipment, high VDT or fluorescent light fields, distinguish hot vs. ground wires with *Electric* setting (.5 – 100 kV/m, 60 Hz); measure antenna radiation patterns, leaky microwave ovens, etc. on *RF/microwave* setting (50 MHz to 3 GHz, .01 to 1 mW/cm²).

Electric and magnetic settings are omnidirectional, measuring full magnitude of fields without the need to reorient the meter. Price of $145 includes delivery and one-year warranty.

AlphaLab, 1272 Alameda Ave, Salt Lake City, UT 84102 Call (801) 532-6604 for speedier service or free literature on electromagnetic radiation health risks.

A NO-RADIAL VERTICAL THAT COVERS 80 OR 75 METERS?

THERE'S ONE NOW!

No, we won't insult your intelligence by telling you that it's a "halfwave" or that ANY vertical will operate more efficiently without a good radial system than with one; it certainly won't! If you want expensive fairy tales talk to our competitors! If, however, you've no room for even the smallest radial system just install the most efficient multiband vertical in the business, the HF9V-X, over our counterpoise kit. You'll not only save a tidy sum but you'll work DX that the shorter and more lossy no-radial "halfwaves" can't touch because both the HF6V-X and HF9V-X use longer active element lengths for higher radiation resistance and greater efficiency on more bands than any of the so-called halfwaves. Ask for our free brochure for complete specs on all Butternut models and receive technical note DLS-1 "Dirty Little Secrets from the Antenna Designer's Notebook") that shows you how to calculate the probable efficiency of any vertical antenna using the manufacturer's own specs so you won't have to learn the truth the hard way!

NEW! **Model HF9V-X (shown to the left) for 80/75, 40, 30, 20, 17, 15, 12, 10 and 6 meters.**

NEW! **Model CPX counterpoise kit for Butternut models HF9V-X, HF6V, and HF6V-X; substitutes for ground or elevated radials. Self-supporting tubing bolts onto base of antenna. Mast not provided.**

BUTTERNUT ELECTRONICS CO.

P.O. Box 1234, Olmito, TX 78575 (210) 350-5711

W9GR DSP II

What is DSP? DSP allows the "construction" of various filters of great complexity by using computer code. This allows us to have easy access to a variety of filters, each perfectly optimized for whatever mode we are operating. The DSP II has been designed to operate in 10 different modes. Four filters are optimized for reducing interference to SSB phone signals from CW, heterodynes and random noise interference. Four more filters operate as "brick-wall" CW bandpass filters. The remaining two filters are designed for reliable recovery of RTTY and HF packet radio information signals. A single front panel switch selects any of these filters. Easy hookup to rigs speaker jack.

• The W9GR DSP II is the most popular DSP on the market — Thousands in use worldwide!

W9GR DSP Filter $299.95
12V DC Power Supply.....$11.95

SDP-600

Make and receive phone calls from your mobile rig or handie-talkie with your own personal autopatch. Connection is easy — just hook-up to the mike and speaker jacks on your base station rig and plug into the phone line! Complete control is assured through touch-tone access codes that you set and change at will. Long distance toll access is controlled by special code that you set, preventing fraudulent usage. All programmable codes and set-ups are stored in special non-volatile memory immune to power failures. Repeater owners use the SDP-600 as well for reliable and solid repeater autopatches. Power required is 12 volts DC at 100 MA. Experience the freedom of owning your own autopatch, on you own frequency, to use when and as you wish. The SDP-600 is made in the USA and carries a one year warranty.

SDP-600 Personal Autopatch, fully wired.....$249.95
SDPA 12 volt powersupply unit $11.95

j-Com Transceiver Control Computer Interface

The j•Com Transceiver Control Computer Interface is functionally identical to the **Kenwood IF-232C, Icom CT-17, Yaesu FIF-232C, Ten-Tec 305 and Heath** computer interfaces. It will work with all radios and rig control software which use these interfaces.

- **No external power supply is necessary.** The j•Com TC interfaces require very little power for operation.This power is obtained directly from the computer COMM port.
- **All electronics are enclosed in the shielded DB-25 connector hood.**RFI susceptibility and radiation is reduced.
- **Fully assembled and tested.**
- **Fully Hardware and Software Compatible.** Works with all rig controlled software — Free shareware disk included!

RAMSEY ELECTRONICS, INC

793 CANNING PARKWAY VICTOR NY 14564

ORDERS CALL
1-800-446-2295
ORDERS ONLY

TECH/ORDER/INFO (716)924-4560 FAX (716)924-4555

TERMS: Satisfaction guaranteed. Examine for 10 days. If not pleased return in original form for refund. Add $4.95 for shipping, handling and insurance. For foreign orders add 20% for surface mail. COD (U.S. only) add $5.00. Orders under $20 add $3.00 NY residents add 7% sales tax. 90-day parts warranty on kit parts. 1-year parts & labor warranty on wired units.

j•COM • 793 CANNING PKWY • VICTOR, NY 14564

CIRCLE 55 ON READER SERVICE CARD

HAMS WITH CLASS

Carole Perry WB2MGP
Media Mentors Inc.
P.O. Box 131646
Staten Island NY 10313-0006

Bright Idea for a Trip

One of the most popular trips that the seventh grade students in my school go on is the trip to the Franklin Institute Science Museum in Philadelphia, Pennsylvania. Over a million visitors a year come to this wonderful place where they are encouraged to "please touch" the exhibits. I, of course, have my own favorite spot to send the children to explore: the amateur radio station, W3TKQ.

The first thing the children see when they enter this impressive building on Benjamin Franklin Parkway at 20th Street is the 21-foot, 144-ton marble statue of Ben Franklin. For over 50 years it has sat there; immense, powerful, a symbol of the great American and Philadelphian who was a publisher, inventor, and statesman for the early United States two centuries ago.

The children always come back with terrific stories about their day at the Institute, and how they had so much fun at the radio station. The ham volunteers who are at the station are usually pleasantly surprised when a group of youngsters from my ham radio classes come through. It's generally an exciting experience for all.

This past summer I was visiting some friends in Philadelphia, and decided to extend the weekend and visit W3TKQ. My two very gracious hosts were Merrill KT3Z and Bill KA3ZHB. It's amazing how there is always "instant comaradarie" when hams meet. My friend Roger W2SLP and I were given a tour of the facility and had a chance to spend time speaking with museum visitors at the amateur radio station.

An entire wall of the exhibit is dedicated to displaying radio equipment from as early as 1918. With the help of Mrs. Gioia Marconi Braga, the inventor's daughter, the Phil-Mont Mobile Radio Club put together an exhibit which contains a set of pictures that describe Marconi and his achievements in a story fashion. There are 42 photographs that clearly show the development of Marconi's inventions. The Phil-Mont Radio Club has exclusive rights to show a video feature about Marconi called "The Spark That Shook The World."

Photo A. Carole WB2MGP with Merrill KT3Z at W3TKQ.

Photo B. Carole WB2MGP and Roger W2SLP at the mike; Bill KA3ZHB speaking to visitors.

This exciting exhibit has been in operation since 1952. It has been sponsored since 1962 by The Phil-Mont Mobile Radio Club, Inc. The recently remodeled station has been seen by more than 120,000 visitors since it was formally rededicated on October 23, 1991, by Marconi's daughter. There are seven console positions. Members of the Phil-Mont Club were asked to donate at least $15 each. Each console was marked for dedication by any person who would donate $500 for that station. In less than a month, all consoles had been "sold."

The seven positions consist of:

1. Dedicated 2 meter intercom for the club's local repeater, plus Kenwood 144 MHz and 220 MHz.

2. IBM computer and MFJ TNC running Alinco 1200 dedicated NTS system for visitors and locals.

3. Satellite tracking station: ICOM 970 and Tandy computer running "Quick Track" and "Kansas City Tracker" programs.

4. Kenwood 950 with PK232, TL922, monitor scope and Rupp SWR/power meter to a Mosley PR067 10-40m beam.

5. Guest operating position: Kenwood TS450, computer and KAM all-mode TNC for HF/VHF packet.

6. Ten-Tec Omni VI with tuner to a Cushcraft R7 antenna.

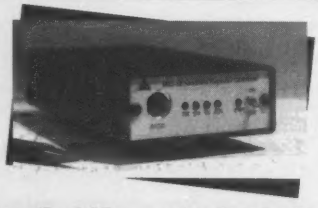
7. ATV: WR450 transceiver, local monitors, 2m intercom, video output terminal and tripod-mounted camera.

When I spoke with the club president, Ed Masarsky KB3IV, he praised the work of the volunteers who man the station seven days a week. Volunteers are not necessarily all members of the Phil-Mont Radio Club. They are all dedicated and do a terrific job interacting with the public, according to Ed. Ed also explained that the visit to W3TKQ is very often someone's first exposure to amateur radio. From what I observed, myself, when I was there, all the visitors were greeted by enthusiastic, knowledgable volunteers.

It's easy to see why the youngsters have such a positive experience at the station. If you live in the vicinity of a museum or science institute, try to get your local clubs to sponsor a radio station for the benefit of the community, especially the children.

If you plan to take a class or large group to the Franklin Institute, it would be wise to call the ARS ahead of time to make sure that the volunteers will be ready for the group at a specific time. Call (215) 448-1139.

Note: I'm still looking for youngsters for the Dayton '95 Youth Forum. Please have interested children call me at (718) 983-1416 for an interview. 73



Handheld Repeater Controller

Spectrum Electronic Products introduces the world's first handheld repeater controller. No larger than most handheld radios, the **HRC-10** converts a single or dual-band radio into a full featured simplex or duplex repeater system. Key features of the **HRC-10** include voice IDer, DTMF Control and programming, hang and time-out timers, Digital Voice Operated Squelch (DVOS™), telemetry tones, and private voice mail slot.

Phone 408-438-2788
FAX 408-438-6027
$299

CIRCLE 69 ON READER SERVICE CARD

JAZZ UP YOUR REPEATER

- Give your repeater a variety of tail messages
- Pre-schedule announcements of special events
- Voice mail feature
- Control remotely via DTMF
- Digital packet cluster info converted to voice
- In use world-wide

- Complete system -computer board and software for **$259** U.S.
- Many interesting features - call for information package

1-800-563-5351 Toll Free From USA 1-306-781-4451 Direct
1-306-781-2008 FAX 1-306-781-2070 BBS

DIGITAL COMMUNICATIONS INC.
P.O. Box 293, White City, SK, Canada SOG 5B0

CIRCLE 181 ON READER SERVICE CARD

FREE CATALOG!

MCM Electronics . . . The best in electronics – every time!

The best in ***service*** with toll-free ordering and technical assistance. Orders shipped within 24-hours from two locations. The best product ***selection*** with over 21,000 items. The best catalog with hundreds of new items each issue plus. An easy to use reference index for convience. Just the best ***value*** in consumer repair electronics!

For your FREE Catalog mail this card today or

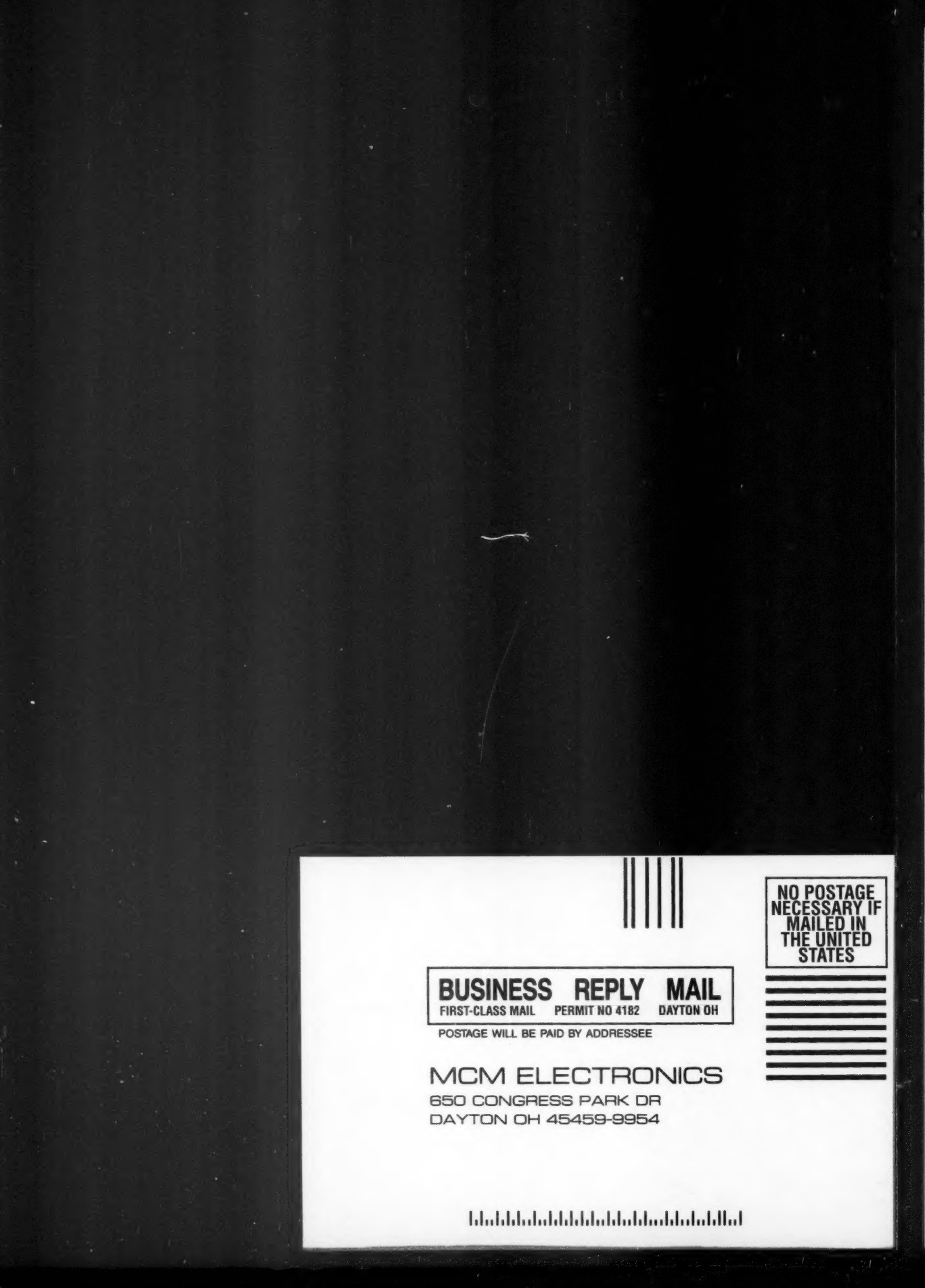
call TOLL FREE 1-800-543-4330

Distribution facilities in Dayton, OH and Reno, NV to serve you better.

BUSINESS NAME _____ **CITY** _____

YOUR NAME _____ **STATE** _____ **ZIP** _____

ADDRESS _____ **PHONE (____)** _____ **73-04**


NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES
BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO 4182 DAYTON OH
POSTAGE WILL BE PAID BY ADDRESSEE
MCM ELECTRONICS
650 CONGRESS PARK DR
DAYTON OH 45459-9954

Weather Satellite Imagery

PCMCIA Convertible Capture Board

- Low power - PCMCIA type II
- Use on your Laptop and Desktop
- HF Marine, NOAA polar satellites, GOES satellites
- Perfect for boat, vehicle, plane, or home

Full Function Software

- DOS and Windows
- Sea surface temperatures
- Coastline and Lat/Lon grids
- GOES animation
- Decodes WEFAX headers

The Best in PC based Weather Satellite Imagery

OFS WeatherFAX

High Performance Satellite Weather Facsimile

OFS WeatherFAX, Phone/Fax: (919) 847-4545

6404 Lakecrest Court, Raleigh, NC 27612

Sell your product in *73 Amateur Radio Today*
Call Dan Harper today. . . **1-800-274-7373**

24 HOUR SHIPPING

ELENCO • HITACHI • B&K PRODUCTS
GUARANTEED LOWEST PRICES

TO ORDER CALL TOLL FREE
1-800-292-7711
1-800-445-3201 (Can.)

AFFORDABLE - HIGH QUALITY
2 YEAR WARRANTY

ELENCO OSCILLOSCOPES

STANDARD SERIES
S-1325 25MHz $349 S-1340 40MHz $495
S-1365 60MHz $849

Features:
- High Luminance 6" CRT
- TV Sync
- 1mV Sensitivity
- 2 - x1, x10 Probes
- X-Y Operation
- Complete Schematic
- Voltage, Time, + Frequency differences displayed on CRT thru the use of cursors (S-1365 only)
- Plus much, much more

DELUX SERIES
S-1330 25MHz $449 S-1345 40MHz $575
S-1360 60MHz $775

Features:
- Delayed Sweep
- Dual time base
- Automatic Beam Finder
- Illuminated internal graticule
- Z Axis Modulation
- Built-in Component Test
- Plus all the features of the "affordable" series

Hitachi Compact Series Scopes

V-212 - 20MHz Dual Trace	$425
V-525 - 50MHz, Cursors	$1,069
V-523 - 50MHz, Delayed Sweep	$995
V-522 - 50MHz, DC Offset	$975
V-422 - 40MHz, DC Offset	$849
V-222 - 20MHz, DC Offset	$695
V-660 - 60MHz, Dual Trace	$1,375
V-665A - 60MHz,DT, w/cursor	$1,449
V-1060 - 100MHz, Dual Trace	$1,549
V-1065A - 100MHz, DT, w/cursor	$1,695
V-1085 - 100MHz, QT, w/cursor	$2,125

B&K OSCILLOSCOPES

2120 - 20MHz Dual Trace	$389
2125 - 20MHz Delayed Sweep	$539
1541B - 40MHz Dual Trace	$749
2160 - 60MHz Dual Trace, Delayed Sweep, Dual Time Base	$949
2190 - 100MHz Three Trace Dual Time Base, Delayed Sweep	$1,379
2522A - 20MHz / 20MS/s Storage	$869

Digital Multimeter EDM-838 — $175.00 — Almost every feature available Bargain of the decade

Elenco LCR + DMM LCM-1950 — $79 — 12 Functions Freq to 4MHz Inductance Capacitance

Digital Capacitance Meter CM-1555 — $49.95 — • Measures capacitors from .1pf to 20,000µf • 3-1/2 Digit LCD readout with unit indicator

Digital LCR Meter LCR-680 — $79.95 — • 3-1/2 Digit LCD Display • Inductance 1µH to 200H • Resistance .1Ω to 20MΩ • Capacitance .1pf to 200µF

Function Generator GF-8026 — $239 — Int/Ext Operation Sine, Square, Triangle, Pulse Ramp, .2 to 2MHz, Freq Ctr

3-3/4 Digit Multimeter BK-390 — $139.00 — • 0.1% DCV accy • Analog bar graph • Auto/manual ranging • 4,000 count LCD display • Capacitance meas. • Temperature probe

Digital Multimeter Kit with Training Course By Elenco M-2665K — $49.95 — • Full function 34 Ranges • Extra large display • Ideal school project
M-2661 (Assembled) $55.00

Frequency Counter F-1225 — $225.00 — • 8 Digit LED display • Wide measuring range • High sensitivity • Data hold function • Input impedance 1MΩ or 50Ω • 10:1 Input attenuation function

FLUKE MULTIMETERS
(All Models Available Call)

Scopemeters		70 Series	
Model 93	$1,225.00	Model 70II	$89.95
Model 95	$1,549.00	Model 77II	$149.00
Model 97	$1,795.00	Model 79II	$175.00
10 Series		80 Series	
Model 10	$62.95	Model 87	$289.00
Model 12	$84.95		

FM Receiver Kit & Training Course — $44.95 AR2N6 Built

Ideal training aid for beginners. Makes it fun and easy to learn about amateur radio
• Covers both 2 meter (144-148MHz) and 6 meter (50-54MHz) FM
• Dual conversion superheterodyne

$34.95 AR2N6K KIT

Butane Soldering Iron — ISOTIP #7980 — $24.95

Two tools in one! Perfect, portable tool for hobbyists and technicians

Combination Emf/Microwave Tester EM 204 — $89.95 — Affordable electromagnetic (Emf) and microwave tests made easy!

Telephone Kit PT-223K — $14.95 — Available Assembled PT-223 $15.95

Function Generator Blox #9600 By Elenco — $29.95 — Kit $26.95 — Sine, Triangle, Square wave

Learn to Build and Program Computers with this Kit — MM-8000 By Elenco — $129.00

From scratch you build a complete system. Our Micro-Master trainer teaches you to write into RAMs, ROMs and run a 8085 microprocessor, which uses similar machine language as IBM PC.

Electronic Tool Kit TK-1000 — $39.95

A professional organizer tool kit at affordable prices. Includes 25 high quality tools in a high impact carrying case which includes a pocket for meter.

Digital/Analog Trainer
Complete Mini-Lab For Building, Testing, Prototyping Analog and Digital Circuits
XK-525 — $159.95 — Kit XK-525K — $129.95

Elenco's trainer is designed for school projects, with 5 built-in power supplies. Includes a function generator with continuously variable, sine, triangular, square wave forms. All power supplies are regulated and protected against shorts.
The case can include a full line of tools and meter of your choice.

Transistor Radio Kits with Training Course
AM/FM Radio Model AM/FM-10B $29.95
AM Radio Kit Model AM-550 $19.95

Telephone Line Analyzer
Kit TT-400K $19.95
Assembled TT-400 $26.95

WE WILL NOT BE UNDERSOLD
SAME DAY SHIPMENT • ORDERS 'TIL 6PM CALL
ALL PRICES AND SPECS SUBJECT TO CHANGE WITHOUT NOTICE
PROBES INCL. ALL SCOPES & METERS

C&S SALES INC.
1245 ROSECLARE • BENSENVILLE, IL 60106
FAX: 708-520-0085 • (708) 541-0710

15 DAY MONEY BACK GUARANTEE
FULL FACTORY WARRANTY
WRITE FOR FREE CATALOG

CIRCLE 184 ON READER SERVICE CARD

ALL ELECTRONICS

FAST SERVICE • DISCOUNT PRICES

7 Vdc MOTOR

Matsushita
MMX- 7AC O 8A
1.25" diameter x 1.25" high motor. Prepped with 1.61" diameter flywheel, pulley and fiberglass mounting board.

$1.00

CAT# DCM-54

100 for $80.00

2 1/2" 8 ohm SPEAKER

Special purchase of these 8 ohm, 1 watt speakers allows us to sell quantities at very special low prices. Mounting frame is 2.6" square. Overall depth, 0.75."

CAT# SK-251

$1.25

10 for $10.00
100 for $75.00
1000 for $ 600.00

MINIATURE TOGGLES

S.P.D.T. (ON-ON)

Right-angle, pc mount. 0.25" threaded bushing Rated 5 amps @ 125 Vac.

75¢ each

CAT# MTS-4RT

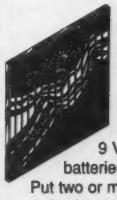
10 for $7.00 • 100 for $65.00

D.P.D.T. (ON-ON)

ALCOSWITCH # MTM206NPC
Short bat handle, 0.25" long. PC terminals.

CAT# MTS-82PC $1.25 each

25 for $25.00 • 100 for $90.00



9 VOLT 60 MA SOLAR PANEL

These 6" X 6" glass enclosed photovoltaic panels produce 9 Vdc at 60 ma. Ideal for charging batteries and powering small devices. Put two or more together for more current and voltage. Includes hook-up instructions.

$5.25 each

CAT # SPL-960

ORDER TOLL FREE
1-800-826-5432
CHARGE ORDERS to Visa, Mastercard or Discover

TERMS: Minimum order $10.00. Shipping and handling for the 48 continental U.S.A. $4.00 per order. All others including AK, HI, PR or Canada must pay full shipping. All orders delivered in CALIFORNIA must include local state sales tax. Quantities Limited. NO COD. Prices subject to change without notice.

CALL, WRITE or FAX for a FREE 64 Page CATALOG
Outside the U.S.A. send $2.00 postage.

MAIL ORDERS TO:
ALL ELECTRONICS CORPORATION
P.O. Box 567
Van Nuys, CA 91408
FAX (818)781-2653

CIRCLE 194 ON READER SERVICE CARD

HOMING IN

Radio Direction Finding

Joe Moell P.E. KØOV
P.O. Box 2508
Fullerton CA 92633

Up and Running with GPS

"What's the bearing?" Many times an hour, that's my demand to the helpers as I drive on hidden transmitter hunts (sometimes called foxhunts or T-hunts). It is important to know the latest indication from our radio direction finding (RDF) equipment. We don't want to be caught off guard by a sudden change in signal direction as we close in or as the road meanders.

In unfamiliar areas, my second most frequent request is, "Where are we, anyway?" When there are no familiar landmarks, that question may not be easy to answer, especially at night. Fortunately, there is now an inexpensive method to determine one's exact location anywhere on planet earth: The Global Positioning System (GPS).

The GPS constellation of 21 orbiting satellites provides high accuracy UHF timing signals that are used by inexpensive specialized receiver/processors to compute your location. Most GPS receivers also perform navigation functions such as computing headings and distances to destinations or waypoints of your choice.

"Homing In" for October 1994 explained how navigation systems such as GPS came about. This month, let's take a closer look at the latest GPS equipment and methods for integrating it into automated signal tracking networks.

It's Affordable Now

Typical of early models of all new technologies, the first GPS receiver/computers were quite expensive. Commercial mariners bought them, but their prices were beyond most pleasure boaters and hikers. Hams who wanted to extract GPS position and course data for applications such as Automatic Packet Reporting System (APRS) found that bare-bones GPS receiver cards for the original equipment manufacturing (OEM) market were the only way to buy GPS capability without shelling out over a thousand bucks.

Selling for about $450, the Magellan OEM 5000 is a 3.5" x 7" GPS receiver card that operates from a 12-volt source. It puts out 4800 bps serial data at user-selectable intervals, but it has no display or enclosure. A similar unit, called the Basic Encore, is made by Motorola.

As competition and manufacturing efficiency have increased, prices of full-function receiver/processors have dived into the pocketbook range of weekend sailors and T-hunters. For most applications, a hand-held GPS display is now more economical than a receiver card. Just make sure that the set you choose has a serial data output for connection to your computer and RDF system. (Look for "NMEA-0183 interface" in the specifications.)

Last spring, the Garmin GPS-50 hand-held GPS broke the $400 barrier, and marine dealers' shelves were quickly cleared. Garmin continues to add features to new models in its line, keeping prices in the $400 to $500 range. Now, the Meridian GPS Satellite Navigator from Magellan Systems Corporation costs less and is the top contender for most popular choice among T-hunters (Photo A). It has a detachable antenna that can be separated from the receiver by up to six feet, so you can put it on your car roof. It outputs your choice of three NMEA-0183 data streams.

Discount marine stores carry the Meridian for less than $380. Its internal three-AA-cell supply lasts for about five hours (much less if you use the backlight at night). You can get an external power kit for $80 to connect it to the vehicle's 12-volt system. This kit also includes a quick-release mounting bracket and antenna extension cable.

Several T-hunters here are experimenting with Meridian GPS units. Mine gives solid indications with an external antenna. Its navigation features were second-nature to use after about a week of practice during my commute. My only gripe is that the liquid crystal display has a highly polished window. As you can see from the photo, it is nearly impossible to find a mounting position that does not give some glare in the daytime. That can make it hard to read, despite its good-contrast 3/8-inch-high numbers.

Photo A. I used a cellular phone swivel mount to attach the Magellan GPS bracket to the overhead console in the van to put it at eye level. A four-foot length of RG-58 cable connects it to the rooftop antenna.

Will GPS receiver prices drop even more? Well, improved parts are making them much less expensive to manufacture. For example, a new integrated circuit from GEC Plessey in England puts all the active circuits for converting GPS information in its incoming spread-spectrum form into the final IF stage into one chip. But many think that receiver consumer prices will remain at present levels because sales are brisk.

Someday this may change, due to competition from alternate positioning services. *Electronics World And Wireless World Magazine* reports that Inmarsat, an international satellite operator, has announced the inclusion of navigation transponders on its next generation of satellites. The system will feature signals to correct the deliberate errors introduced into Navstar GPS. Position fix accuracy will be within 10 meters, 10 times better than civilian units at present. Launches are planned to begin in late 1995.

An Automatic Pin in the Map

A GPS receiver displays your exact latitude and longitude in degrees and fractional minutes. Those numbers by themselves mean nothing to most of us landlubbers. We tend to think in terms of distance and direction with respect to familiar landmarks, instead.

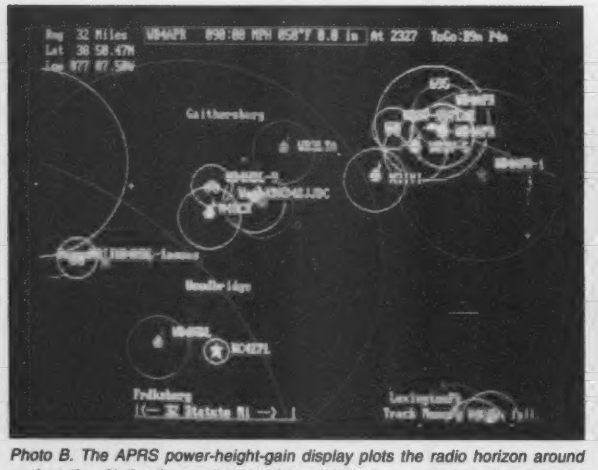


Photo B. The APRS power-height-gain display plots the radio horizon around each station. Notice the small circle of the mobiles (car symbol), the larger circles of the base stations (house symbol), and even larger green ones for digipeaters (green stars on the screen). Any two stations with intersecting circles can communicate directly. (All screen photos are by WB4APR.)

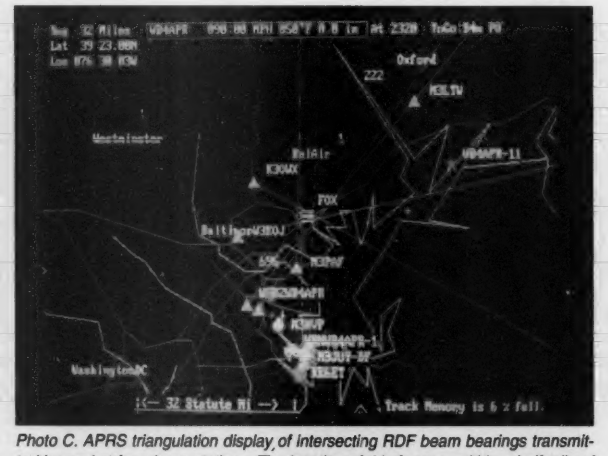


Photo C. APRS triangulation display of intersecting RDF beam bearings transmitted by packet from base stations. The location of this fox was within a half mile of the intersection of the bearings. Most were taken 15 to 20 miles away. Any APRS user in radio range can call up this display, including mobile T-hunters.

COMMUNICATIONS/ELECTRONICS OFFICERS

Woods Hole Oceanographic Institution is seeking qualified Electronics/Communications Officers for either long term or short term relief assignments. Reporting to the Master, operates and maintains the ship's communications equipment, transmits all forms of message traffic, and maintains safety watch at sea. Operates all shipboard communications equipment, including satellite, radio, telephone, TELEX, FAX systems and related computers. Responsible for proper operation, maintenance and repair of Radio room and select Bridge equipment; including but not limited to navigation, radio, receiver, and positioning equipment. Maintain logs and charges appropriate accounts for radio calls and satellite use. Prepares monthly reports to the Master and Port Office on equipment and usage aboard all Institute vessels. In addition the Communications/Electronics Officer will perform other duties as required.

Minimum licensing for *R/V Knorr* is a FCC Second Class Radiotelegraph Operator's Certificate with six-month and Ship Radar Endorsements. *R/V Atlantis II* requires a FCC General Radiotelephone Operator's License with Ship Radar Endorsement. All Woods Hole vessels require a valid US Merchant Mariner's Document endorsed as a Radio Officer.

Send resume to: Robert L. Flynn, Marine Personnel Coordinator, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, 508-457-2000 ext. 3220. WHOI is a smoke free workplace.

WOODS HOLE OCEANOGRAPHIC INSTITUTION 1930

An equal opportunity affirmative action employer
M/F/D/V.

WOODS HOLE OCEANOGRAPHIC INSTITUTION

OAK HILLS RESEARCH
QRP Headquarters

NEW!

QRP CLASSIC DUAL BAND TRANSCEIVER KIT

- Dual band Transceiver kit for the 20M & 40M bands
- Superhet receiver design with diode ring mixer & RF pre-amp
- High side LO injection on both bands for a cleaner signal
- 4 pole crystal ladder filter
- 4 pole audio filter
- AGC circuit
- Vfo tuning with 8:1 vernier dial covering 100 KHz
- RIT w/center detent control providing ± 1 KHz of range
- Sidetone oscillator w/level control
- Silky smooth QSK circuit
- 4 - 5 watts of RF output on both bands
- Tx output power adjustable from 0 to full output
- Both Iambic and manual key jacks provided
- 12VDC operation — Current drain is 200mA on Rx and 1 A on TX
- Measures (HWD):4" X 6 1/4" X 6 7/8" and weighs 48 oz.
- 100% complete kit — All coils are prewound
- All panels prepunched for optional Iambic keyer

NEW LOWER PRICE!

MasterCard

- Cat # CL2040 .....$219.95
- Cat # KEY1 Optional Iambic Keyer kit....$ 39.95

VISA

9AM to 6PM Mon.-Fri. EST.

OAK HILLS RESEARCH
20879 Madison Street
Big Rapids, MI 49307

Michigan Residents Add 6% State Sales Tax

(616) 796-0920 Fax: (616) 796-6633

CIRCLE 82 ON READER SERVICE CARD

RUN DON'T WALK to The Orlando HamCation

Central Florida Fairgrounds

February 17, 18, 19, 1995 ARRL North Florida Convention

Hurry! Last year was a complete sellout. All exhibit space was taken. The Fairground has enlarged its facilities and we now have more air-conditioned space.

PRIZES | FORUMS | SWAP TABLES

EXAMS | EXHIBITORS | TAILGATE

Name_____ Call_____

Address_____

City_____ State_____ Zip_____

Tickets-Before Jan 15	( )	@ $ 6.00	Tot (.)
Tables	( )	@ $25.00	Tot (.)
Tailgate	( )	@ $15.00	Tot (.)
RV Per NITE	( )	@ $16.00	Tot (.)

Make checks to HamCation & Mail to: HamCation
P.O. Box 547811• Orlando, FL 32854-7811

CIRCLE 96 ON READER SERVICE CARD

If you enter your favorite landmarks as waypoints in the GPS set's processor, it will display your distance and bearing to them, along with your present direction of travel and speed. That's helpful, particularly for finding your way home at the end of a transmitter hunt. But what most of us want is an easy-to-read indication of our exact position on a map of some kind. Automakers are developing navigation systems like this for cars of the future, but they are still pricey.

T-hunters are inventing a number of ways to get the same kind of map display, using portable computers with serial ports connected to the NMEA data port of their GPS sets. In the September 1994 issue of *73 Amateur Radio Today*, "Homing In" described a computerized bearing display by software engineer Robert Barris KD6IFZ. Since then, Robert has added a Meridian GPS to his system. He wrote a program to use GPS serial data to pinpoint his vehicle's exact position on the complete Orange County street map that he has digitized and stored in compressed form on the hard drive in his Macintosh PowerBook.

When the coordinates come into the computer's RS-422 port from the GPS, his program analyzes them, calls up the appropriate map segment and draws it on the screen around his position point in the exact center. As he drives, the map moves under his position point to update his location.

"The new program translates your GPS location onto the map very accurately, usually within five houses on the street," Robert says. "It allows us to concentrate on driving and bearing-taking for a while, then look down and very quickly see where we are without having to unfold the map and flash a light over it.

"I added a feature that lets the GPS display communicate with the RDF program, so they run together in a multitasking fashion," he continues. "We can see the true beam bearing (the bearing relative to the car plus the true car heading) as long as we're moving. That has some limitations, because GPS only gives accurate headings when in motion. I put a threshold in the software so that when the car's velocity goes below 10 kilometers per hour, the beam heading disappears from the screen.

"We've used it on three hunts now, and the experience has been uniformly positive, especially when we are in unfamiliar areas. We can drive around instinctively for a few minutes making random turns here and there and then say, 'This isn't paying off, where are we and which way do we have to go?' Then we can look at the computer map and there we are."

Robert has not yet fully integrated the mapping program with the RDF bearing display program for real-time plotting, but he is planning on doing that soon. "It has great promise for our first-finder-wins RACES T-hunts because of the ability to take a very accurate bearing while moving," he adds. "On the freeway at 55 MPH, it could lay down successive bearings as you move along, so you get an idea of where the T is before you pass the right exit."

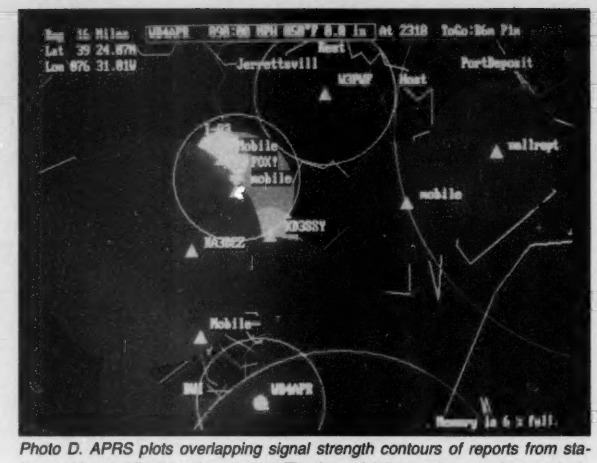


Photo D. APRS plots overlapping signal strength contours of reports from stations with omnidirectional antennas. The large (violet on the actual screen) circles show negative reports. Chances are, the hidden transmitter is not in those regions. Brighter, smaller circles in shades of blue on the screen show places where the fox signal is heard with various strengths.

Every Road in the Country

Another local hunter is using a commercial map data base program to navigate electronically. To do it, Eric Nansen N6YKE installed a PC and CD-ROM drive in his vehicle, along with a GPS receiver.

DeLorme Publishing Company produces two domestic atlas data-base

• • • *ANNOUNCING* • • •

FOR THE FIRST TIME . . . CLEAR AND CRISP REPEAT AUDIO!

THE NEW STANDARD IN AUDIO PROCESSING TECHNOLOGY FROM C3I.

- THE C3I-1000P AUDIO PROCESSING MODULE USES THE FINEST MILSTD DESIGN AND PRODUCTION TECHNIQUES, BASED ON OVER 25 YEARS EXPERIENCE IN THE DEFENSE MARKET PLACE, INSURING UNBELIEVABLE AUDIO CLARITY THRU YOUR REPEATER WHILE REDUCING BACKGROUND NOISE TO A MINIMUM. SOON WITH OPTIONAL AGC AND SIGNAL PROCESSING!
- ARE YOU TIRED OF LISTENING TO USER SQUELCH TAILS? GET RID OF THEM WITH OUR C3I-1000D AUDIO DELAY MODULE. UP TO 150 msec DELAY.
- THESE TWO PC BOARDS, TAKEN TOGETHER, OCCUPY LESS SPACE THAN A PACK OF CIGARETTES IN ALL DIMENSIONS!
- YOUR CONTROLLER WILL INSTALL WITH EASE IN OUR CUSTOM FABRICATED RM-1000 EMI ENCLOSURE, COMPLETE WITH POWER SUPPLY AND SPACE FOR OTHER OPTIONS. THE RM-1000 IS AVAILABLE NOW FOR YOUR CAT-300, 500 AND CAT-1000 REPEATER CONTROLLERS, OR ANY OTHER CONTROLLER MOTHERBOARD!
- OUR RELATIONSHIP WITH COMPUTER AUTOMATION TECHNOLOGIES, THE CAT-300, 500 & 1000 PEOPLE, ALLOWS US TO FULLY INTEGRATE YOUR NEW CONTROLLER INTO OUR ENCLOSURE, ADDING C3I. OPTIONS, AND FULLY TESTING YOUR CONTROLLER BEFORE DELIVERY.
- LET US HELP YOU REACH TOP PERFORMANCE! CALL OR WRITE TODAY FOR YOUR FREE INFORMATION KIT ON ALL C3I. PRODUCTS TO INCLUDE OUR LOW NOISE / HIGH REJECTION RF PRESELECTORS, REPEATER REMOTES & OTHER AUDIO PRODUCTS.

C3I., 406 NORTH PITT STREET, ALEXANDRIA, VA, 22314-2316
(703) 684-6980 OFFICE, (703) 684-1382 FAX
1-800-224-5137
Owen Wormser, K6LEW Sam Ruffin, KM4OI

CIRCLE 91 ON READER SERVICE CARD

CAT-300 Repeater Controller

Attention Repeater Owners

Finally a repeater controller with a TI voice synthesizer and full feature autopatch incredibly priced at $299.00.

Features Include:

- ✓ *Voice Synthesizer*
- ✓ *Twelve Voice Messages*
- ✓ *Two Voice Identifiers*
- ✓ *Full Feature Autopatch*
- ✓ *User Speed Dials*
- ✓ *DTMF Key Pad Test*
- ✓ *DTMF Repeater Access*
- ✓ *(56) Control Functions*
- ✓ *Remote Control Switches*
- ✓ *DVR Controller Ready **
- ✓ *(412) Word Vocabulary*
- ✓ *Female Voice & Sound Effects*
- ✓ *CW Identifier*
- ✓ *Reverse Autopatch*
- ✓ *Emergency Speed Dials*
- ✓ *Programmable Courtesy Tones*
- ✓ *DTMF Repeater Muting*
- ✓ *Programmable Codes and Timers*
- ✓ *Hardware Logic Inputs*

** (Requires MF-1000 Serial Interface Card $59.00)*

Write or Call for a brochure describing the CAT-300 Controller, including schematic, voice word list, and control functions.

CAT-300 Controller Board $299.00 Wired and Tested

Computer Automation Technology, Inc.
4631 N.W. 31st Avenue, Suite 142,
Fort Lauderdale, Florida 33309
(305) 978-6171

CIRCLE 268 ON READER SERVICE CARD

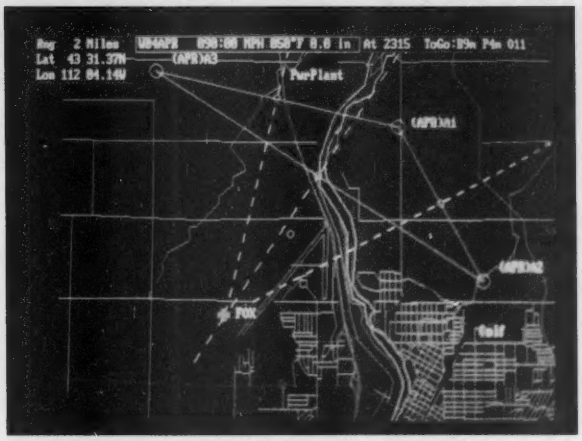


Photo E. The APRS fade circle technique computes the likely location of an unknown signal from three locations of equal signal strength. A mobile DF station with an omnidirectional antenna drives to three places where the fox signal fades out. APRS computes where a fox should be to give these fade-out points.

products on CD. Street Atlas USA version 2.0, which retails for about $170, has detailed digital road maps of the entire USA. Eric says he has used it on "All Day" T-hunts where he ended up in the middle of the California desert. He found that the digital map included many out-of-the-way jeep trails that were not on his paper maps. One reason for this is that DeLorme solicits its users to send in new road information to be incorporated in updates of both its paper and electronic maps.

The PC program requires at least a 386 running Windows 3.1 with 2 MB RAM and a mouse. There is also a Macintosh version. You can view streets and addresses with Street Atlas, but if you want to interface with GPS, you must move up to another program, Map Expert. It has the same internal atlas, but also accepts NMEA GPS data into any serial port in the computer to plot your position.

Map Expert allows you to create and save your own overlay files to add landmarks, buildings, and new roads to your map screens. Unfortunately, the overlays cannot include moving data, such as a real-time RDF indication. Eric is writing an add-on program to do this. He says that his biggest problem so far has been keeping the mobile CD-ROM drive functional while four-wheeling in the desert.

PC requirements for Map Expert are the same as for Street Atlas, but there is no Macintosh version. Retail price is $495, but it is available directly from DeLorme for $295 plus shipping and handling.

Economical Tracking With APRS

As I described three months ago, the APRS program by Bob Bruninga WB4APR is an economical alternative for GPS mapping. You don't need a CD-ROM, a large hard drive, or Windows. You can track yourself and others on VHF T-hunts using just a low-end PC laptop with a floppy and serial input for the GPS data (8086/640K/CGA or better, color preferred). APRS.EXE size is only about 300K and maps average about 15K each.

Of course, you cannot put super-detailed maps in 15K files. There is no room to store every twist and turn of every road or to hold residential street names. But if you have the disk space, you can have over a hundred map files available for automatic selection by the program as you move about.

APRS makes up for its lack of detail by incorporating a myriad of networking features unavailable elsewhere. APRS stations can use packet to map one another's positions. They can also exchange messages and data on packet, including RDF bearings.

[Editor's note: We regret that we cannot print these photos in color.] Photo B shows a typical network of APRS stations transferring packet data via unconnected (UI) frames. APRS will plot the radio range of all stations. Users instantly see potential paths for direct connection and digipeaters available for relay. Stations not sending specific values for power, antenna height, and gain in their automatic position report are given the default of 10 watts, 20 feet, and 3 dB omnidirectional antenna gain.

With another user command, APRS displays the triangulation solution for RDF stations reporting their beam bearings (Photo C). In an APRS network, everyone sees the triangulation almost instantaneously. Reporting stations assign a quality rating to their

Continued on page 67

Striking News From PolyPhaser
May 1994
Volume 3, Number 2
(800) 325-7170
New Earth Radiation Belt Has Interstellar Matter
Why dc Continuity Protectors, Like Simple Gas Tubes and 1/4 Wave Stubs, Don't Work
Typical 1/4 wave stub VSWR and loss

Do You Know...

- 1/4λ stub protectors ring with lightning energy?
- which material shields lightning's H field?
- dc continuity RF protectors don't work?
- why single point grounding works best?
- about latent equipment damage?

FREE - join 25,000+ readers and learn from The Leader in Lightning & Grounding Solutions

PolyPhaser CORPORATION

(702) 782-2511 ■ FAX: (702) 782-4476 ■ 2225 Park Place ■ P.O. Box 9000 ■ Minden, NV 89423-9000

CIRCLE 49 ON READER SERVICE CARD

ATV

Number 20 on your Feedback card

Ham Television

Bill Brown WB8ELK
c/o 73 Magazine
70 Route 202 North
Peterborough NH 03458

Space Camp Adventure

One of the advantages of living in the rocket city (Huntsville, Alabama) is the proximity of the U.S. Space Camp facility. Located at the U.S. Space and Rocket Center, Space Camp (and Space Academy) offers a variety of programs. Participants from fourth grade through adult glide through astronaut training and shuttle mission simulation. Organizers have taken an interest in demonstrating amateur radio as part of their program and are currently constructing a complete amateur radio station at the site.

To celebrate the 25th anniversary of the first moon landing, I offered to fly an ATV balloon from Space Camp to demonstrate that amateur radio could simulate the launch of a weather and communications satellite. They were excited by the idea and asked me to fly the payload as part of their International Space Camp session that included selected students from 23 countries and the teacher of the year from each U.S. state. The local chapter of the National Space Society, HAL5, agreed to co-sponsor the event and the flight preparations began in earnest.

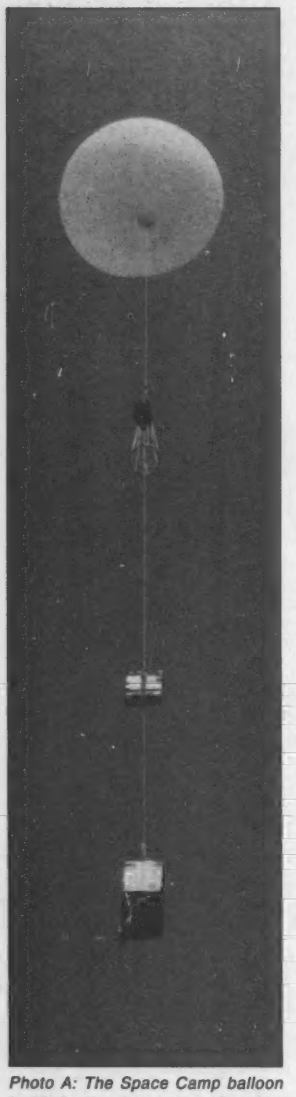


Photo A: The Space Camp balloon heads for the stratosphere after skirting past a Saturn rocket. The balloon system consisted of a simplex repeater on 2m and an ATV transmitter with a live color camera suspended on the bottom. (Photo by Jim Skala WA8VWY.)

The Payload

Using components from a number of previous flights, I put together a 5-watt ATV transmitter on 434 MHz, complete with a color camera. The exciter was a Mini-TV postage-stamp-sized transmitter (ATVM-70) feeding a PA5 power module (SAU4 brick), available from P.C. Electronics, 2522 Paxson Lane, Arcadia, CA 91007; tel. (818) 447-4565. The PA5 module is capable of 10 watts or more, but by backing the exciter power down a bit, I was able to achieve around 5 watts output with a current drain of around 1.5 amps. The current drain was critical since anything more than this would put a strain on my lithium cell pack. The color camera (model HA4500) is lightweight and compact and has a built-in electronic auto-iris. It's available from Howard Enterprises, Inc., 545 Calle San Pablo, Camarillo, CA 93012; tel. (805) 383-7444. The antenna was an omnidirectional horizontal "Little Wheel" available from Olde Antenna Lab; tel. (303) 798-5926; mounted on a dowel rod about 18 inches below the styrofoam package. The whole system was powered by five D-cell lithium batteries (15 volts @ 7.5 Ah).

A separate package was constructed to simulate the communications satellite. It consisted of an ICOM 2AT and a digital voice storage circuit that operated as a simplex repeater. It would record whatever it heard for eight seconds and retransmit it in a continuous cycle on 144.34 MHz. This proved to be a very simple and effective way to build a repeater without having to worry about desense problems. It just took a little practice to get used to the delay when using the repeater.

The Flight

Although the morning of July 31st started out overcast, the weather started clearing up as the ground station was assembled and the payload was prepped for launch. We were situated in Rocket Park, behind the U.S. Space and Rocket Center, literally surrounded by rockets of all shapes and sizes. Thanks to the efforts of Gene Marcus W3PM, Ed Stluka W4QAU, and others of the Huntsville Amateur Radio Association (HARA) and the HAL5 branch of the NSS, an impressive ground station was wired up next to a Lunar Module in the center of the park.

As the balloon was inflated, Space Camp participants assembled around the launch site to watch the activities. We slowly reeled out the balloon. I held onto the ATV payload and finally got my chance to say, "That's one small step for a man, one giant leap for a balloon!" I released the payload and the balloon skirted past a towering Saturn I rocket on its way to the edge of space. The downlinked video was spectacular, providing us with an impressive aerial view of the rockets surrounding the park.

As the flight progressed, a constant stream of intrigued onlookers glued themselves to the TV screen while they watched the city of Huntsville get smaller and smaller as the balloon gained altitude. Live views from the balloon could even be seen on a wide-screen TV in the Center's cafeteria.

A hour and a half into the flight, the payload was over 115,000 feet high and the blackness of space and the curvature of the earth could be seen in full color, with a P5, signal at the launch site. Tom WA8ZAH in Cincinnati reported a nearly P5 picture from 300 miles north of Huntsville, while Dick W8RVH (New Carlisle, Ohio) and Mark KA9SZX (Champaign, Illinois) saw a P3 picture at a distance of nearly 370 miles.

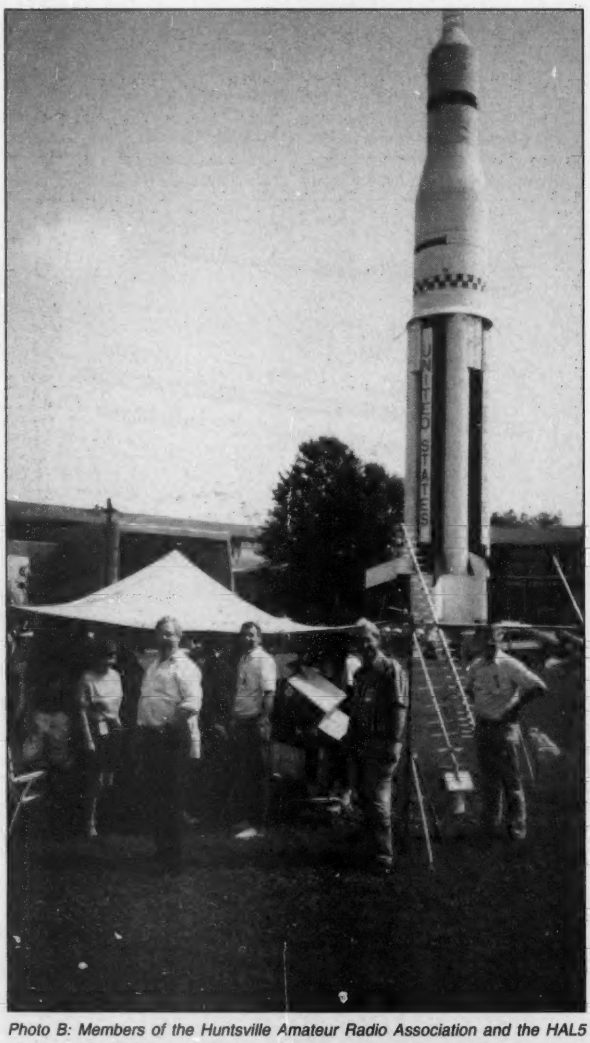


Photo B: Members of the Huntsville Amateur Radio Association and the HAL5 chapter of the NSS operate the ground station in the middle of Rocket Park at the U.S. Space and Rocket Center.

The simplex repeater on 2m worked great, with stations contacting each other over a large portion of the Midwest and Southeast. At least one contact covered a distance of over 500 miles between Ralph N4NEQ (Marietta, Georgia) and Joe KEØFF in Rolla, Missouri. Unfortunately, a screw worked loose inside the HT and shorted out the frequency-select line towards the end of the flight, causing the transmitter to shift up 22 kHz. Only a few stations were able to work through the repeater after that, due to the oddball shift.

The Recovery

Since we were having so much fun at the Space Camp ground station, most of the chase crew didn't leave to track down the balloon until long after it had burst and was nearly on the ground. It appeared that the payload would land in the hills of Tennessee (about 40 miles north of Huntsville) and it looked like it was going to be a difficult recovery. Fortunately, John Fox WB2LLB and Barry N4MSJ were able to record a clear, nearly snow-free image from the payload almost to the point of hitting the ground. The video sequence clearly showed that the payload had landed on a farm in the middle of a valley. A great place to land, but whose farm had it fallen on? Based on a few beam headings, we searched fruitlessly for the rest of the day around the Fayetteville, Tennessee, area but found no trace of the payload.

Disappointed, but not yet defeated, we returned to WB2LLB's QTH to view the landing video to see if we could figure out its location. The video was nearly P5 until about 500 feet before the payload hit the ground. There were plenty of landmarks: farm buildings, a river and a highway. There had to be a way to figure out the location with this kind of information!

Dick Curtis KK4HF and Barry Lankford N4MSJ found the solution. The next day they took a camcorder and a small TV set to the county courthouse nearest the estimated landing site and showed the video to the tax assessor. The tax assessor's clerk immediately recognized the buildings and said, "That's the McGee chicken houses!" Sure enough, after an hour of romping around the McGee farm, the payload was found in the middle of his cow pasture!

I think Dick Curtis summed up the flight nicely during his evening TV news broadcast, "From near space to the back forty, all in one day!"

Sell your used ham gear in Barter 'n' Buy. Call 1-800-274-7373.

AMATEUR TELEVISION

GET THE ATV BUG

≥10 Watt pep Transceiver
Only $499

Made in USA
Value + Quality
from over 25years
in ATV...W6ORG

Snow free line of sight DX is 90 miles - assuming 14 dBd antennas at both ends. 10 Watts in this one box may be all you need for local simplex or repeater ATV. Use any home TV camera or camcorder by plugging the composite video and audio into the front phono jacks. Add 70cm antenna, coax, 13.8 Vdc @ 3 Amps, TV set and you're on the air - it's that easy!

TC70-10 has adjustable 10 Watt p.e.p. with one xtal on 439.25, 434.0 or 426.25 MHz & properly matches RF Concepts 4-110 or Mirage D1010N-ATV for 100 Watts. Hot GaAsfet downconverter varicap tunes whole 420-450 MHz band to your TV ch3. 7.5x7.5x2.7" aluminum box.

Transmitters sold only to licensed amateurs, for legal purposes, verified in the latest Callbook or send copy of new license.

Hams, call for our complete 10 pg. ATV catalog including downconverters, transmitters, linear amps, and antennas for the 400, 900 & 1200 MHz bands.

(818) 447-4565 m-f 8am-5:30pm pst Visa, MC, UPS COD

P.C. ELECTRONICS
2522 Paxson Lane Arcadia CA 91007
Tom (W6ORG)
Maryann (WB6YSS)

HOMING IN

Continued from page 65

RDF reports. The highest quality bearings are displayed as continuous yellow lines, while lesser quality bearings show up as dashed lines.

Sometimes there are not enough base or mobile stations with directional antennas in range of the RDF target to get bearings for triangulation. Bob has added a mode to APRS to help in such situations, taking advantage of the power-height-gain data from non-directional receiving installations.

Photo D is the omni-RDF display, showing the overlapping signal strength contours from stations reporting only strength of the fox, not direction. Violet filled-in circles are null reports where stations do not hear the fox. They give very important data on where the fox is not. Bright blue circles are fox-heard reports.

The reports on this screen were manually entered as RDF objects, since they were voice reports taken from mobiles not participating on the mobile foxhunt. But such reports could also have been relayed automatically via packet. When interpreting the display, remember to look at the edges of the circles and not be misled by the centers. In this case, the mobile fox was right at the edge of one "not-heard" circle.

If a mobile has no RDF antenna, or wants to hunt covertly without one, that user has an additional option for getting a bearing on the RDF target (Photo E). He or she drives away from the general hunt area in several directions and presses the F5 key each time the signal fades out. APRS then computes the circle passing through these points, generates bearing lines and plots their intersection. The fox should be near the center of this circle.

The display does not show a circle because the computation is actually done using straight connecting lines and virtual bearings normal to these lines. The fade-out bearing technique can be repeated closer to the fox by inserting attenuation and finding three new fade points, repeating as necessary.

Bob continues to add new APRS RDF features and applications faster than I can test them. When he told me about the latest version (v6.0), he said, "You can now create a square, circle, or triangle in latitude/longitude coordinates and it will be transmitted as a object to everybody's screen. If you draw a boundary area of a foxhunt that way, everybody will see it. A square can be as small as 100 yards or as large as 100 miles. Rescue groups can use it to transmit the area of a search, too."

APRS is shareware, available for download on most online services such as CompuServe's HamNet. If it meets your needs, register your copy to get configuration saving and GPS port interface functions. If you cannot find the latest version, call the Annapolis BBS at (410) 280-2503 to download it. Registered copies on 3.5-inch HD disks are available directly from WB4APR.

Next time, more on APRS applications and a close look at the new Macintosh implementation of APRS. Thanks to KD6IFZ, N6YKE, and WB4APR for providing information and photos for this month's column. If you are experimenting with GPS and computer mapping for RDF, please pass along your ideas and experiences. Write to my California address atop this column, or send electronic mail to me via the Internet (joemoell@cup.portal.com) or at CompuServe (75236,2165).

Resources in This Article

Magellan Systems Corporation
960 Overland Court
San Dimas CA 91773
(909) 394-5000

DeLorme Publishing Company
966 N. Main
Freeport ME 04032
(207) 865-4171

Bob Bruninga WB4APR
115 Old Farm Ct.
Glen Burnie MD 21060

Number 21 on your Feedback card

HAM HELP

We are happy to provide Ham Help listings free on a space available basis. To make our job easier and to ensure that your listing is correct, please type or print your request clearly, double spaced, on a full (8 1/2" x 11") sheet of paper. You may also upload a listing as E-mail to Sysop to the 73 BBS /Special Events Message Area #11. (2400 baud, 8 data bits, no parity, 1 stop bit. (603) 924-9343). Please indicate if it is for publication. Use upper- and lower-case letters where appropriate. Also, print numbers carefully—a 1, for example, can be misread as the letters l or i, or even the number 7. Specifically mention that your message is for the Ham Help Column. Please remember to acknowledge responses to your requests. Thank you for your cooperation.

NEEDED: Instruction manual for a B&W Model "600" Dip Meter. I will pay for photocopies and postage. Tnx. *Neil Tanner WA4CHQ, P.O. Box 109, Gwynns, VA 23066.*

NEEDED: Service manual/schematics for MOTOROLA Mobile Transceiver, Model T53GKT-1100A. Xmtr type CC3010; S/N J-4336. Primary Power 12V DC. I will pay for copy and postage. Thanks. *John Wora K2KFG, So.-4907 Clifton Pkwy., Hamburg NY 14075-3341.*

WANTED: Functioning XTAL Filter USB/LSB for DRAKE Model TR3 Xcvr. *Bob Bartolotta K1YFE, 95 Rockwood Ave., Ansonia CT 06401.*

ABOVE & BEYOND

VHF and Above Operation

C. L. Houghton WB6IGP
San Diego Microwave Group
6345 Badger Lake Ave.
San Diego CA 92119

Switching Power Supplies for Portable Operation

Switching power supplies are somewhat of a mystery to many in our amateur ranks. The secret of operation lies in a black epoxy chip circuit that defies close examination, and as such might remain a mystery. Because we cannot remove the epoxy and examine the chip or circuitry closely, let's take a short detour and cover just what is going on in a switching power supply.

First, why do we need to switch power supplies? Well, the simplest reason is to provide a different voltage level from a source that is not of the proper voltage (lower voltage). Of course, this could be just the reverse of the above: high voltage input and low voltage output. We have all constructed simple power supplies with a string of positive voltage regulators, all connected to a common input for a multiple output bench test supply. This system works well, but each output is usually low current—less than an amp. The operation in this case is to reduce a voltage through a transistor junction which is in series with the input and output of the power supply.

As a result of this series transistor, it is "on" all the time and has to dissipate power in a *linear* function. The overall efficiency of transfer of input to output power is low, being something less than 40% or so, just like your linear amplifier for SSB operation, whose efficiency is low (input power divided by output power equals efficiency). So goes the same with a power supply.

In a lot of functions this is quite acceptable, particularly for lower current systems. To make this point and drive it home, consider that you do not see a "Monster" single chip regulator for your 12-volt solid-state HF station or 10W 2 meter transceiver. You do see a very heavy bulky power transformer at 60 Hz, with a small regulator and a single or several series pass transistors that are connected to a heat sink that is required to dissipate heat generated in the regulation process. A typical 12 volt linear 10 amp power supply weighs in at about 15 pounds.

Now, to avoid a pun, let's switch to a nonlinear power supply, or *switching power supply*. This type of power supply uses quite a few extra components to accomplish this more complex task. In the long and short of it, the switching system performs better. Let's see why by taking a look at a basic circuit in comparison to the linear circuit type. Comparing the circuit in Figures 1 and 2, it is evident that the pass transistor shown in Figure 1 is on all the time. The pass transistor shown in Figure 2 is switched, or has an *on and off* period. This is the switching rate and is controlled by the circuitry in the device and its external control circuitry.

By being *off* part of the time, according to load conditions, a better power management condition exists and as a result the efficiency is about doubled, compared to a linear circuit. Another trade-off is that the switch mode power supply does not require a bulky 60 Hz power transformer. It uses a very high frequency switch frequency, and the transformer can be replaced with a toroidal-type transformer much smaller in size. The weight of a switching power supply for 12 volt output at 10 amps is less than a pound, as opposed to the 15 pounds in a linear supply.

All is not wonderful in a switch-mode power supply. It requires a larger output filter circuit, making the circuitry more complex and costly vs. a linear supply. You might remember back when there were tubes in automobile radios and the power supply for them was controlled by a *vibrator*. I kind of look at this older behemoth as sort of a marriage between switching and linear technology. It was switching of a sort, not pass regulator switching like the TTL equivalent shown in Figure 3, which uses a conventional transformer or toroid core to step up voltage.

I guess I should explain that a vibrator was a mechanical switch with 12 volts on the center contact from the auto battery. When it was turned on, a coil magnetically pulled the armature of the vibrator one way to make contact with one side of a transformer coil. It would then break the magnetic pull and in the released direction make contact with the opposite side of the transformer. The center tap would be ground and the resulting 12 volts, switched from one side to the other of the input transformer coil, would look like switched AC on the primary. Whether done mechanically or electronically, the principle is the same today: An alternating rate is required to

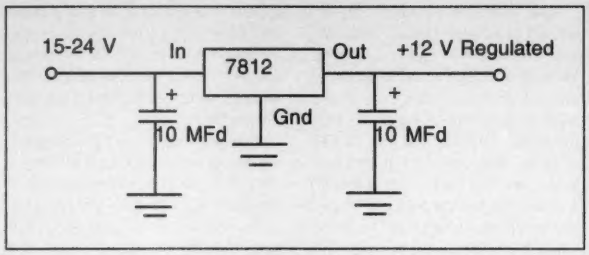


Figure 1. Basic linear regulator (7812, etc., typical).

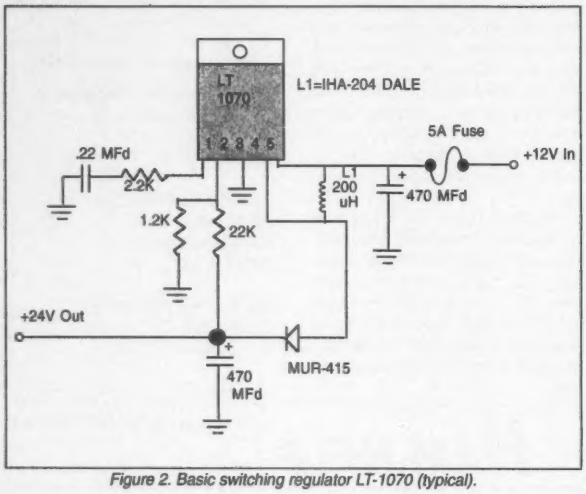


Figure 2. Basic switching regulator LT-1070 (typical).

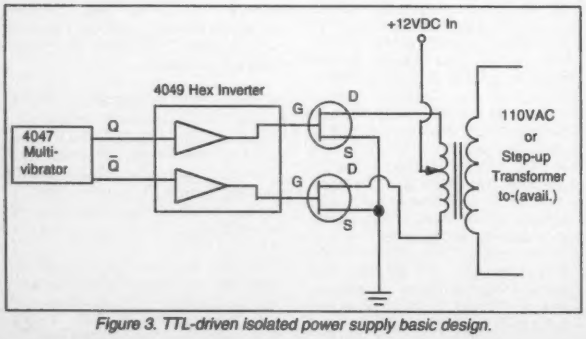


Figure 3. TTL-driven isolated power supply basic design.

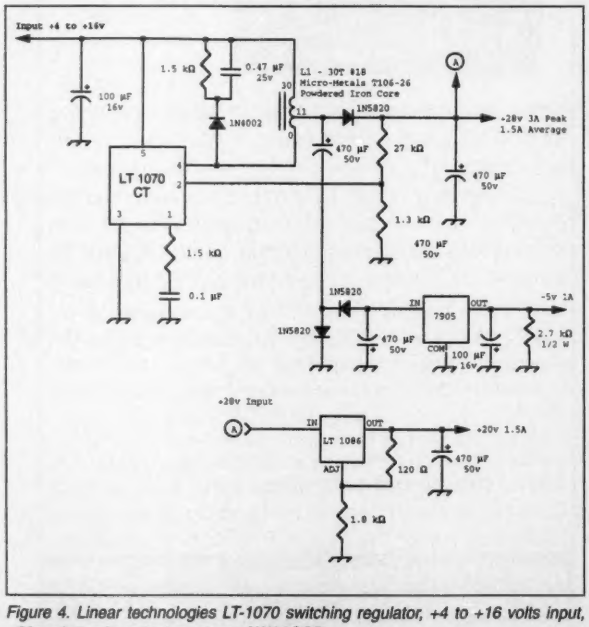


Figure 4. Linear technologies LT-1070 switching regulator, +4 to +16 volts input, +28 and -5 volts output courtesy of WA6CGR.

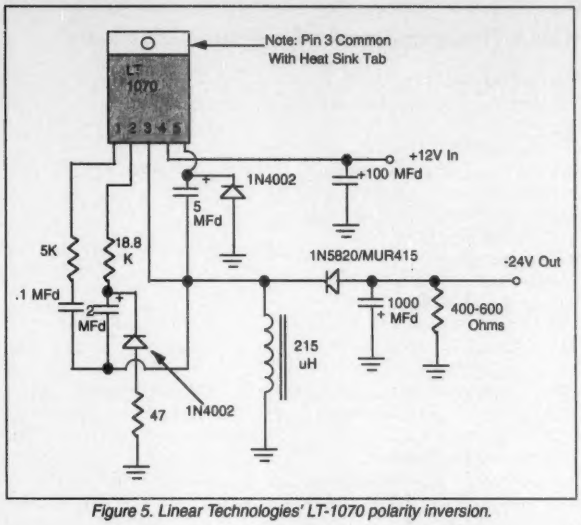


Figure 5. Linear Technologies' LT-1070 polarity inversion.

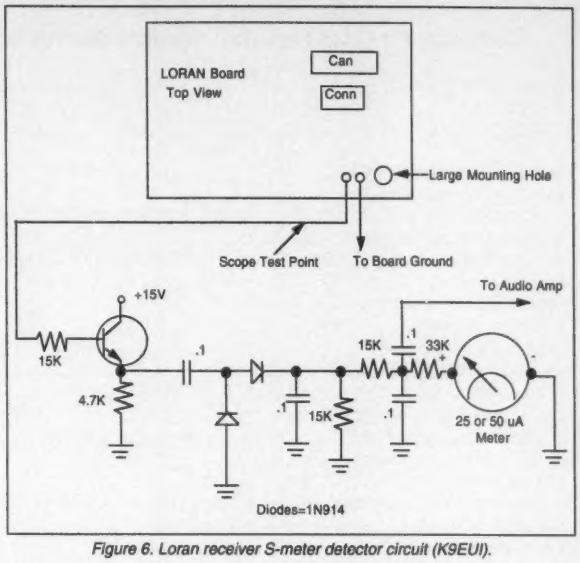


Figure 6. Loran receiver S-meter detector circuit (K9EUI).

induce current into another winding of a transformer.

Enter the LT-1070, a switching regulator from Linear Technologies. It differs from the TTL-type switching circuit as much as from the mechanical vibrator switching types in that the TTL and vibrator should not be called switching types at all. In fact, the TTL and vibrator examples are linear in all respects. Only the LT-1070 is a true switch mode regulator because it has a on and off period. See Figure 4 for a schematic diagram of this circuit.

The use of the LT-1070 can be altered to provide negative as well as positive voltage outputs of low to higher voltages from a single 12 volts input supply. This circuit has application in our microwave portable use in that most surplus relays and associated equipment are made to operate from 24 volts in military surplus. Surplus telephone microwave equipment is made to operate from 24 or 48 volts and positive ground. This little switching regulator will fill the bill to provide operation from either scenario, positive or negative output. Input voltage can be a car battery (12 volts), negative ground in either case, as in the circuit shown in Figure 4.

For the other polarity of operation for the majority output of this circuit, use the schematic shown in Figure 5, with a negative output at 24 volts. This is not the last straw but rather one method to show an application for this type of power supply.

As far as component selection goes for switching power supplies, an increased cost in their construction is necessary due to the higher value of filtering capacitors. Additionally, the inductors used must be capable of carrying a high current with very low resistances (less than 0.2 ohms), and the rectifiers must be switching-rated; that is, they must be a very fast rectifier specifically designed for switching-type use. A 1N4000 series rectifier is not suitable for this application; however, a Motorola MUR415 or similar ultra-fast recovery rectifier is rated for switching use.

Updated Loran Program Generates Gridsquare (by K9EUI)

The sidebar shows an update to the Loran receiver program. This new program was written by Bob K9EUI and is quite an improvement to the basic program presented in the August 1994 "Above and Beyond" column. Bob did a very fine job, and deserves quite a bit of credit for his innovations in adapting the concept we mentioned: merging the Loran and grid square location programs. Thanks again, Bob, for your fine contribution to this project.

The updated program allows for variation in latitude and longitude, with the mean average to be displayed along with the position status and grid square. Bob also included a signal strength indicator circuit for the Loran receiver (see Figure 6 for details). The input signal at the test point runs about 8 volts peak-to-peak, and averages around 2.5 VDC. The meter circuit can be very useful for mobile work, while an o-scope is the best way to monitor signal conditions in the shack. The test point to connect to is the second hole from the corner mounting hole (see Figure 6). I have to take my hat off to Bob for his very fine contribution to this Loran project.

Well, that's it for this month. I have been very busy with family activities and haven't had much time to spend in the shack working on construction projects. One nice test equipment update is that the noise meter that our group has been using was thought to have 5 dB of excess noise ratio (ENR) for noise figure evaluation. Well, we found it to be 4.3 dB ENR, and that gave us a big improvement concerning past noise figure measurements. It makes previous readings much lower and better than we thought. It's always nice to get some good test equipment to confirm calibration.

Next month I plan to cover microwave stripline tuning procedures. The methods are not frequency/band selective, as the Method Of Procedures (MOP) apply to all static-sensitive GaAs FET circuitry. This MOP'ING up will make working with sensitive GaAs FETs quite easy. As always, I will be glad to answer questions concerning this and other related topics. Please send an SASE for a prompt response. 73 Chuck WB6IGP.

See the program listing on page 70

All Aluminum

Chassis Kits
Cabinet Kits
Assembled Cabinets
Slope Box Kits
UHF & VHF Antenna
Power Divider Kits
Rack Shelves
Rack Equipment Cabinets
Antenna Grounding Kits
Tower Mounted Box Kits
Dipole Hangers
Other enclosures

Small sheets Aluminum and Brass

Byers Chassis Kits
Charles Byers K3IWK
5120 Harmony Grove Road, Dover, PA 17315
Phone 717-292-4901
Between 6PM and 9:30PM EST. Eves.
"Distributorship Available"

CIRCLE 222 ON READER SERVICE CARD

The World of Ham Radio Callsign Jan 95 Database

The World of Ham Radio CD-ROM includes the FCC amateur call sign database. Scan over 750,000 US ham calls in just seconds with CALLSIGN. A D-Base data file is also included for all your special callsign applications needs. You will receive the latest releases in ham radio software programs covering all the amateur categories from programmers all over the world. Let CDVIEW guide you while viewing over 7,000 IBM program files, over 1,000 radio mods, and thousands of SWL frequencies. Available by subscription three time a year in May, September, & January for $99 US, $109 Foreign. Single issue $40 plus shipping: USA $3, Overnight USA $10, Foreign airmail $5, AmSoft, PO Box 666, New Cumberland, PA 17070-0666 USA FAX: 717-938-6767

$40 CD-ROM

VISA MasterCard

AmSoft 717-938-8249

CIRCLE 113 ON READER SERVICE CARD

Smart Battery Charger

JUN 87 QST
BY WARREN DION N1BBH

FOR GEL-CELLS or LEAD ACID BATTERIES.
Features: Precision temperature tracking voltage reference & three mode charging sequence. Standard kit is for 12V @ 1/2 or 1 Amp, user selectable. Can be connected to the battery indefinately, will not overcharge. Weighs 2 pounds and measures 4"W x 5½"D x 2½"H. Finished enclosure included in kit.

Complete Kit Only **$59.95**
Assembled & Tested **$79.95**

CA Residents add 7.75% sales tax. S&H: $5.00 (insured). Foreign orders add 20%. For more info or price list; send legal size SASE (52¢) to:

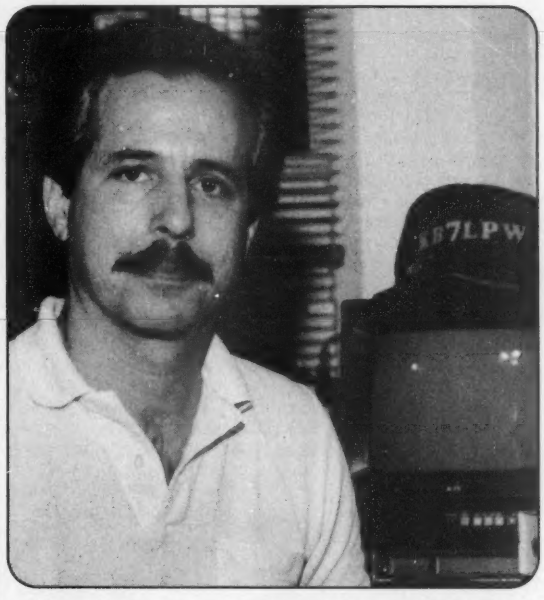
A&A Engineering
2521 W. La Palma #K • Anaheim, CA 92801
(714) 952-2114 • FAX: (714) 952-3280

Computer Program for Loran Receiver Boards (by K9EUI) (Program Derives Six-Figure Gridsquare)

```
10 ON ERROR GOTO 970
20 OPEN "I",#1,"LORAN.INI"
30 INPUT #1,P,C1$,C2$
40 CLOSE #1
50 CLS:KEY OFF:DIM X$(40)
60 L=900000!:N=1800000!
70 CLOSE:LOCATE 3,26:PRINT"LORAN Navigation System"
80 LOCATE 4,26:PRINT"________K9EUI_________"
90 LOCATE 6,30:PRINT"1. System setup":LOCATE 8,30:PRINT"2.
Run Program"
100 LOCATE 10,30:INPUT"3. Quit ",X
110 IF X=1 THEN 1020
120 IF X=2 THEN 140
130 GOTO 950
140 LOCATE 6,30:GOSUB 670:LOCATE 8,30:GOSUB 670:LOCATE
10,30:GOSUB 670
150 LOCATE 25,10:PRINT"      <ESC> to quit      <SPACE> to
clear max/min readings";
160 ON P GOTO 170,180,190,200
170 OPEN "COM1:1200,N,8,1,RS" AS #1:GOTO 210
180 OPEN "COM2:1200,N,8,1,RS" AS #1:GOTO 210
190 OPEN "COM3:1200,N,8,1,RS" AS #1:GOTO 210
200 OPEN "COM4:1200,N,8,1,RS" AS #1
210 LOCATE 9,26:PRINT"LAT    LONG    ST POSER MODE"
220 C$="I "+C1$+" "+C2$:GOSUB 330:GOSUB 350
230 C$="OD":GOSUB 330:Z=1:GOSUB 350
240 '
250 C$="A":S=0:GOSUB 330
260 GOSUB 350:IF Z=1 THEN A$=""
270 A$=MID$(A$,3,27):GOSUB 690
280 LOCATE 10,26:GOSUB 670:LOCATE 10,26:IF B$="N" AND
G$="11" THEN 300
290 PRINT A$;:GOTO 310
300 COLOR 15,0:PRINT A$;:COLOR 7,0
310 A$="":C$="B":S=1:GOSUB 330:GOSUB 350:GOTO 250
320 '
330 PRINT #1,C$;:PRINT #1,CHR$(13);:PRINT #1,CHR$(10);:RE-
TURN
340 '
350 D=0
360 X$(D)=INPUT$(1,#1):IF S=1 THEN 380
370 A$=A$+X$(D)
380     FOR I=1 TO 100:NEXT
390 V=EOF(1):IF V=-1 THEN 410
400 D=D+1:GOTO 360
410 IF S=1 THEN GOSUB 440
420 RETURN
430 '
440     FOR I=2 TO 5
450     IF X$(I)="F" THEN H(I)=15:GOTO 610
460     IF X$(I)="E" THEN H(I)=14:GOTO 610
470     IF X$(I)="D" THEN H(I)=13:GOTO 610
480     IF X$(I)="C" THEN H(I)=12:GOTO 610
490     IF X$(I)="B" THEN H(I)=11:GOTO 610
500     IF X$(I)="A" THEN H(I)=10:GOTO 610
510     IF X$(I)="9" THEN H(I)=9:GOTO 610
520     IF X$(I)="8" THEN H(I)=8:GOTO 610
530     IF X$(I)="7" THEN H(I)=7:GOTO 610
540     IF X$(I)="6" THEN H(I)=6:GOTO 610
550     IF X$(I)="5" THEN H(I)=5:GOTO 610
560     IF X$(I)="4" THEN H(I)=4:GOTO 610
570     IF X$(I)="3" THEN H(I)=3:GOTO 610
580     IF X$(I)="2" THEN H(I)=2:GOTO 610
590     IF X$(I)="1" THEN H(I)=1:GOTO 610
600     IF X$(I)="0" THEN H(I)=0
610     NEXT I
620 T=H(5)+16*H(4)+256*H(3)+4096*H(2)
630 IF T>8000 THEN T=T-65536!
640 OSC#=8*T/256+8000000#
650    LOCATE    6,26:GOSUB    670:LOCATE    6,26:PRINT
"OSC=";OSC#;"Hz"
660 Z=0:RETURN
670 FOR I=1 TO 30:PRINT CHR$(32);:NEXT:RETURN
680 '
690 B$=MID$(A$,25,1)
700 G$=MID$(A$,16,2):IF G$<>"11" OR B$<>"N" THEN 860
710 E$=MID$(A$,1,6):E=VAL(E$)
720 F$=MID$(A$,8,7):F=VAL(F$)
730 IF E>K THEN K=E
740 IF E<L THEN L=E
750 IF F>M THEN M=F
760 IF F<N THEN N=F
770 LOCATE 13,26:GOSUB 670:LOCATE 13,26:PRINT"MAX LAT ="K
780     O=(K+L)/2:LOCATE     14,26:GOSUB     670:LOCATE
14,26:PRINT"AVG LAT ="O
790 LOCATE 15,26:GOSUB 670:LOCATE 15,26:PRINT"MIN LAT ="L
800 LOCATE 17,26:GOSUB 670:LOCATE 17,26:PRINT"MAX LONG="M
810     Q=(M+N)/2:LOCATE     18,26:GOSUB     670:LOCATE
18,26:PRINT"AVG LONG="Q
820 LOCATE 19,26:GOSUB 670:LOCATE 19,26:PRINT"MIN LONG="N
830 R=R+1:LOCATE 21,26:GOSUB 670:LOCATE 21,26:PRINT"TOTAL
READINGS=";R;
840 IF R=1 THEN BEEP
850 IF R>0 THEN GOSUB 1150
860 K$=INKEY$:IF LEN(K$)=0 THEN 890
870 IF K$=CHR$(32) THEN GOSUB 900
880 IF K$=CHR$(27) THEN CLS:GOTO 70
890 RETURN
900 LOCATE 13,26:GOSUB 670:LOCATE 14,26:GOSUB 670:LOCATE
15,26:GOSUB 670
910 LOCATE 17,26:GOSUB 670:LOCATE 18,26:GOSUB 670:LOCATE
19,26:GOSUB 670
920 LOCATE 21,26:GOSUB 670:LOCATE 11,26:GOSUB 670
930 R=0:K=0:M=0:L=900000!:N=1800000!
940 RETURN
950 CLS:CLOSE:END
960 '
970 IF ERL=20 THEN RESUME 1020
980 CLS:RESUME 70
990 '
1000 '                    SETUP
1010 '
1020 CLS
1030 LOCATE 12,30:INPUT"Select COM port (1-4): ",P
1040 IF P<1 OR P>4 THEN 1030
1050 LOCATE 14,30:INPUT"Enter starting LAT. (DDMM) ",C1$
1060 IF LEN(C1$)<>4 THEN 1050
1070 LOCATE 16,30:INPUT"Enter starting LONG. (DDDMM) ",C2$
1080 IF LEN(C2$)<>5 THEN 1070
1090 OPEN "O",#1,"LORAN.INI"
1100 WRITE #1,P,C1$,C2$
1110 CLOSE #1:CLS:RUN
1120 '
1130 '                  GRID SQUARE ROUTINE
1140 '
1150 LA=VAL(MID$(A$,1,2)):AM=VAL(MID$(A$,3,2))
1160 LO=VAL(MID$(A$,8,3)):OM=VAL(MID$(A$,11,2))
1170 OM=ABS(OM):IF LO<0 THEN OM=-OM
1180 LO=ABS(LO):LO=LO+OM/60
1190 AM=ABS(AM):IF LA<0 THEN AM=-AM
1200 LA=ABS(LA):LA=LA+AM/60
1210 QP=(180-LO)/20:C=INT(QP):I$=CHR$(C+65):R1=(QP-
C)*10:C=INT(R1):D$=CHR$(C+48)
1220                                                M1=(R1-
C)*24:C=INT(M1):M$=CHR$(C+65):QB=(LA+90)/10:C=INT(QB):J$=C
HR$ (C+65)
1230     R1=(QB-C)*10:C=INT(R1):L$=CHR$(C+48):M1=(R1-
C)*24:C=INT(M1):N$=CHR$(C+65)
1240 H$=I$+J$+D$+L$+M$+N$
1250 LOCATE 11,26:GOSUB 670:LOCATE 11,26:PRINT"GRIDLOC =
";H$;
1260 RETURN
```

HAM RADIO & MORE

National Talk Radio Show With Len Winkler, KB7LPW



America's Only Ham Radio Show On The Broadcast Bands!

Sundays
6:00 pm EST

Weekly Co-Host, John Moore, NJ7E – Weekly DX Update With Lee Finkel, KY7M

Tune in each week for national ham radio news, FCC news, weekly guests from the amateur radio community, ham trivia contests, prizes, listener call-in and more!

Sponsored in part by Radio City, Inc. and *73 Amateur Radio Today* and ICOM.

Ham Radio & More Affilliates

AZ:	KFNN	1510	PHOENIX	IN:	WPDJ	1300	HUNTINGTON	NC: WCRY 1460 RALEIGH
CO:	KBCO	1190	DENVER/BOULDER	KY:	WMTA	1380am	CENTRAL CITY	NC: WNCT 1070 GREENVILLE
CT:	WATR	1320	HARTFORD	MA:	WKPE	1170	ORLEANS	NE: KICS 1550 LINCOLN
FL:	WFFG	1300 am	FLORIDA KEYS	MO:	WBGZ	1570	ST. LOUIS	OK: KTMC 1400 MCALESTER
IL:	WKTA	1330	CHICAGO	MS:	WVMI	570	BILOXI III	OR: KBNP 1410am PORTLAND
IL:	WBGZ	1570	ALTON	NC:	WEEB	990	FAYETTEVILLE	UT: K26DI CH.26TV CASTLEDALE

Ham Radio & More is also available on Satellite!
Spacenet 3, Transponder 9, 6.8 Audio for Home Dish (Analog).

Find out what radio station airs "Ham Radio & More" in your local area by calling the originating station, KFNN, at 602-241-1510.

For sponsorship information contact Ron Cohen at 602-241-0482.

Number 23 on your Feedback card

ASK KABOOM

Your Tech Answer Man

Michael J. Geier KB1UM
c/o 73 Magazine
70 Route 202 North
Peterborough NH 03458

Troubleshooting Audio Stages

Over my many years of repairing things, I've noticed that, in radio gear, breakdowns don't seem evenly distributed. As with just about everything, power supply failures are at the top of the list. But, unlike with, say, VCRs, RF problems are far outnumbered by audio-stage troubles. Why?

Life Ain't Fair

Like the power supply, audio stages carry a lot of power and load. RF output stages work even harder, but they are built with all kinds of protection systems incorporated into their designs, mostly because RF output transistors and modules are so expensive. Also, with the antenna completely left up to the owner, the chance for disaster is just too great.

Audio amps, however, are cheap and seem simple enough that nobody bothers to protect them. That, of course, is not the case with high-fidelity audio gear. Lots of good stereo components are designed with speaker and output stage protection circuits. They're built in for the same reason RF outputs are protected—repairs can cost a bundle.

In your radios, though, the audio stages often are little more than an afterthought, "OK, we've got a signal, I guess we gotta make it big enough to vibrate the speaker somehow." Or, perhaps, "The microphone's gotta get to the modulator one way or the other." So, little effort is expended because, after all, this isn't a high-fidelity medium to begin with. And, with only a few watts of audio power, not much harm is likely to occur, right?

Wrong

Ah, if only real life could be like that! From what I've seen, *lots* of trouble happens all the time. So, let's take a special look at audio problems: what they are, why they happen and how to fix them.

Coming and Going

As far as the audio is concerned, your transceiver has two ends: the mike and the speaker. Let's start with the output side, because it has the most potential for failures. In order to vibrate a speaker cone hard enough for you to hear the radio under noisy conditions, such as in a car, the average HF or VHF/UHF mobile rig puts out a watt or two of audio. Most walkies put out 200-500 milliwatts. Compared to the typical output power of stereo equipment, these levels are peanuts. So why has your stereo kept working for 20 years when your ham gear has blown its audio amp? Well, when was the last time you ran your stereo at full blast and 10 percent distortion for hours on end? (I certainly hope you're not doing that, especially if you want to be able to hear when you get older!) That's exactly what happens with radios, especially in the car. It's not the absolute level that matters, it's the amount of power relative to the maximum design limit. If your HT is rated at 300 mW and you run it all the way up for a long period, that's as taxing to its amplifier as if it were running higher power but designed for it.

So, it shouldn't be surprising that audio output stages blow up. But, before you crack open the rig, make sure it isn't the *speaker* that's popped! While most of the speakers in mobile rigs, and nearly all of the external "communications" speakers, are rated to take the full audio output power of a typical mobile transceiver, they can blow now and then anyway. Test your speaker with an ohmmeter, or try using another speaker, as your first test; only if the speaker seems fine should you go after the amp. By the way, although it's possible for the speaker's voice coil to short, I've never seen that happen; virtually all the blown speakers I've run across have been open. So, if your ohmmeter test shows anything in the 8-ohm range, you can assume the speaker is good. Unless, of course, yours happens to be a 32-ohm or some other odd-value speaker.

HT speakers represent a special case. Unlike those in mobile rigs, many HT speakers are actually rated for power levels far below what the little radios' amps can deliver! I don't know whether the manufacturers do it to save cost or size, but using an underrated speaker is a bad idea, to say the least. I guess they figure that you won't be playing the rig at top volume for long periods, so the *average* output power will stay safely below what the speaker can handle. In car use, though, it just doesn't happen that way. Especially if you accidentally leave your squelch open with the volume all the way up, you may come back to find a dead speaker. Why would you ever do that? I've seen hams deliberately leave the radio with open squelch in order to run the battery down all the way before charging it. Heck, I've done it myself. If you do that, be sure not to set the volume more than about halfway up.

If the speaker is OK, it's time to open up the rig. Before you get to the amp, take a look at the earphone jack. Now and then, a bad connection or a bent piece of metal in the jack can prevent the signal from making it to the speaker. With PC-mounted jacks, the solder joints or PC foils can break from the stress of inserting and removing the plug. If all seems well, scope the line coming to the jack from the audio amp. If it shows a signal, you still have a connection problem. If it's dead (the more likely case), the amp isn't working. If you don't have a scope, you can test with a small speaker. Just connect one end to the common side of the existing speaker (usually chassis ground, but occasionally one of the power supply rails) and the other to the amp's output line, after any coupling capacitors or transformers. No sound means a dead amp.

Only Resting

When is a "dead" amp not really dead? When it's resting! Remember, this is a radio, not a stereo. So, it has a squelch circuit, right? You'd be surprised at how many seemingly dead amps are sitting there in perfect health, waiting to spring into action. To see if your problem is in the amp or the squelch circuit, test for voltages on the audio output stage. Except for a few older radios, just about all HTs, and many mobiles, completely remove the DC power to the audio amp when there's no signal. It really saves power, and it eliminates any annoying, residual noise from distracting the listener. If the whole thing seems dead, with no DC voltage present, you almost certainly don't have an amp problem, and changing the output transistors or IC won't do you any good. Now's the time to work backwards, heading for the squelch circuit.

The Gatekeeper

Many VHF/UHF radios, both HT and mobile, use the Motorola MC3357 or another similar IF/detector chip. This IC has a squelch output which consists of a rising and falling DC voltage. If you go from the audio amp's DC input point and follow it back toward the chip, you'll run into a transistor. This transistor acts as a gatekeeper, allowing the command from the chip to control the substantial current required for the audio output. Failures in this stage are extremely common, so take measurements on the transistor's base. If it rises and falls as you turn the squelch knob back and forth through its threshold, the chip is doing its job, indicating almost certainly that the transistor is open. If, though, you see no action, either the chip or the transistor could be bad. To find out, pull the transistor's base leg and measure the line coming from the chip. If it now works, the transistor is likely bad. If you still get nothing, the chip is suspect. Remember, though, that it could have been blown by a short in the transistor, so they may both need replacement. Before you change that chip, though, be sure both its oscillator inputs have their required signals, and that the IF input is there, too. Naturally, that squelch line will never become active unless the chip is seeing proper signals.

Types of Amps

Once you've decided that the problem is definitely in the audio amp, it's time to start narrowing the problem down. If the radio uses an IC for its audio power output stage, you don't have far to look; the chip either is or isn't bad. But, if it is, you might save yourself a few bucks down the line by thinking about why it blew. Heat buildup from turning the volume control very high certainly can do it, but there are other reasons. One of the most often overlooked is a leaky output coupling capacitor. The amp will still work, but it'll be putting DC power through the very low resistance of the speaker's voice coil, and that will make both the chip and the speaker run hot. The speaker may survive while the chip goes to that great silicon factory in the sky. It can be hard to determine a leaky output cap, so I recommend simply replacing it whenever you have an unexplained failure in a cap-coupled audio power amp. Otherwise, you could replace the chip, only to have it fail again a few weeks later.

If the amp is discrete, you've got a job ahead of you. Discrete amps are almost always of the push-pull variety, and their problems can be tricky to pin down. Usually, the parts carrying the most current go first, so check the output transistors. If there's a coupling cap, suspect it. If there's an output transformer, though, chances are it'll be OK.

Well, we've more to cover, but I'm running out of room. So, let's finish this up next month. Before we go, though, let's look at a letter:

Dear Kaboom,

I have an 80-meter folded dipole on top of a four-story apartment building. My problem is that, whenever I transmit, touch lamps all over the complex go on and off. The neighbors don't appreciate it, and I don't blame them. Is there any way to stop this?

Signed,
Blinky

Dear Blinky,

Ah, there is some justice in this world! Touch lamps have been QRMing hams as long as the little buggers (the lamps, that is) have been around. I've never heard of QRM *to* touch lamps, but it makes sense that it might happen. If the RF is getting in through the lamps' sensing antennas, I don't know how you could stop it without killing the touch action. But, if it's getting in through the AC line cord, which is what I suspect, any decent RF line filter ought to stop the problem. You mentioned in your letter that a ham friend once knew how to fix this but has since lost the instructions. If another reader can send a definitive fix, I'll be glad to put it in the column. Good luck!

Until next time, 73 from KB1UM.

January '95 **Reader Service**

73 Amateur Radio Today

Subscribe NOW!

Yes! Send me 12 issues of 73 at the low rate of $19.97 (Saves 43% off the cover price.) ☐ Bill me ☐ Payment enclosed

Charge my ☐ AMEX ☐ MC ☐VISA

Card # Expires

Name (please print) Call

Address

City State Zip

Canada add $7.00 pus $1.40 GST;
Foreign add $9.00 surface, $42.00 airmail.

This card valid until February 28,1995 in the U.S. and possessions.

"You make the 73 supporting advertisers very happy when you're interested in them" ...Wayne

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330
331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370
371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390
391	392	393	394	395	396	397	398	399	400

Where did you get this copy of 73?
999 newsstand 998 subscription

FREE INFORMATION
READER SERVICE CARD

Reader Service: To receive more information on the products advertised in this issue of 73, circle the appropriate number(s). Please allow 6 weeks for processing of inquiry. Offer valid in the U. S. and possessions.

B9501SS80

Place
Stamp
Here

73 Amateur Radio Today

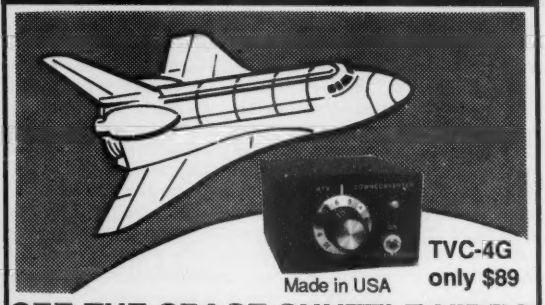
READER SERVICE MANAGEMENT DEPARTMENT
PO BOX 1928
RIVERTON NJ 08077-7528

ADVERTISERS

R.S.#	page
•	A & A Engineering 69
351	Absolute Value Systems 35
164	Ace Communications of Indianapolis 83
149	Advantage Instruments Corporation 2
281	Agrelo Engineering 82
194	All Electronics Corporation 61
•	Alphalab 59
•	Amateur Radio Excellence 58
113	Amsoft 69
74	Antennas West 27
340	Antennas West 82
380	Antennas West 55
368	Antennas West 28
135	Antennas West 30
275	Antennas West 83
116	Antennas West 84
107	Antennas West 85
•	Antique Radio Classified 57
80	Arrow Antenna 85
16	Astron Corporation 19
272	Azden Corporation 38
272	Azden Corporation 39
21	B & B, Inc. 59
41	Barry Electronics Corporation 23
42	Bilal Company 22
56	Buckmaster Publishing 17*
7	Buckmaster Publishing 83*
168	Buckmaster Publishing 38*
•	Burghardt Radio 9
•	Buttemut Electronics 59
222	Byers Chassis Kits 69
184	C & S Sales, Inc. 61
91	C3I 64
•	CABLE X-PERTS, INC. 85
•	CB City International 82
265	Chipswitch 28
156	Commpute Corporation 55
99	Communication Concepts 83
10	Communications Specialists, Inc. 13*
268	Computer Automation Technology 64
276	Computer Aided Technology 83
•	Dayton Hamvention 43
13	Doppler Systems 44
•	Down East Microwave 84
114	E. H. Yost 46
•	Electronics Book Club 25
329	For Hams Only 84
193	GGTE 84
280	Grove Enterprises 40
348	Grove Enterprises 52
94	Halycon Group 46
•	Ham Radio & More 71
•	Hamtronics, Inc. 7
345	HamWindows 28
187	Harlan Technologies 58
179	ICOM, America, Inc. CV2*
•	Indiana Hamfest 85
42	Isotron 22
26	J.M.S. 46
55	J-Com 59
•	Jade Products 17
159	Japan Radio 1
•	K-Comm 48
2	Kawa Productions 35
151	KDC Sound 30
•	Kenwood USA Corporation CV4
234	Lentini Communications 77
47	Link-Com 45
•	MCM Electronics 60A
•	Meadowlake Corp. 35
86	MFJ Enterprises 11
86	MFJ Enterprises 47
86	MFJ Enterprises 75
86	MFJ Enterprises 31
160	Micro Computer Concepts 22
144	Micro Control Specialities 13
193	Morse Tutor Gold 84
114	Mr. Nicad 46
25	Novatech Instruments 17
1	Number One Systems Ltd. 45
82	Oak Hills Research 63
•	OFS 61
102	ONV Safety Belt 30
96	Orlando Hamcation 63
321	Patcomm Corp. 15
•	P.C. Electronics 73*
•	P.C. Electronics 67*
68	Periphex 57
198	Personal Computer Repeater Controller 30
•	Personal Database 30
249	Phillips Industries, Inc. 30
49	Polyphaser 65
145	QSO Software 44
153	Radio City 88
58	Radio Engineers 17
•	*Radio Fun* 73
•	RAI Enterprises 82
34	Ramsey Electronics 21*
•	Rayovac 5
254	Ross Distributing 17
•	RT Systems 17
•	SAMS 17
36	Scrambling News 22
167	Sescom, Inc. 84
188	SGC Inc. 51
250	Software Systems 53
244	Software Systems 82
51	Spectrum Communications 55
69	Spectrum Electronics 60
183	Spectrum International 85
•	Ten-Tec 29
•	The Ham Center 48
384	The Ham Contact 49
384	The Ham Contact 57
269	Tigertronics 78
11	Transel Technologies 55
11	Transel Technologies 57
22	Tri-Ex 51
50	Tropical Hamboree 76
•	Uncle Wayne's Bookshelf 86, 87
32	Universal Electronics 48
•	Universal Radio 17*
•	Vanguard Labs 57
•	Vanguard Labs 58
259	Versatel Communications 22
104	Vis Study Guides, Inc. 48
191	W & W Associates 79
38	W9INN Antennas 48
20	Wolfe Communications 59
•	Wood's Hole Oceanographic Institute 63
•	Yaesu Electronics CV3
114	Yost Company 46
•	ZD Engineering 39
268	Zero Surge Inc. 17

* Advertisers who have contributed to the National Advisory Committee (NIAC).

AMATEUR TELEVISION



TVC-4G only $89

Made in USA

SEE THE SPACE SHUTTLE VIDEO

Many ATV repeaters and individuals are retransmitting Space Shuttle Video & Audio from their TVRO's tuned to Spacenet 2 transponder 9 or weather radar during significant storms, as well as home camcorder video. If it's being done in your area on 420 - check page 501 in the 94-95 ARRL Repeater Directory or call us, ATV repeaters are springing up all over - all you need is one of the TVC-4G ATV 420-450 MHz downconveters, add any TV set to ch 2, 3 or 4 and a 70 CM antenna (you can use your 435 Oscar antenna). We also have ATV downconverters, antennas, transmitters and amplifiers for the 400, 900 and 1200 MHz bands. In fact we are your one stop for all your ATV needs and info. We ship most items within 24 hours after you call. **Hams, call for our complete 10 page ATV catalogue.**

(818) 447-4565 m-f 8am-5:30pm pst. Visa, MC, COD

P.C. ELECTRONICS
2522 Paxson Ln Arcadia CA 91007

Tom (W6ORG)
Maryann (WB6YSS)

Radio Fun

"The beginner's guide to the exciting world of amateur radio."

Radio Fun is packed full of information to help you get more fun out of amateur radio. Basic "how-to" articles will get you up and running on packet, ATV, RTTY, DXing, and the dozens of other activities that make amateur radio such a great hobby. You'll get equipment reviews geared toward the newcomer, letting you know how to get the most out of your new or used gear. We'll help you upgrade to a higher class license with monthly columns designed to teach you what you need to know in a fun and exciting way. We'll answer your questions on hundreds of things—how to check into a new repeater, how to build a QRP transmitter, how to get on the ham satellites, how to fix that broken rig, how a transistor works. You'll find it all, and more, in the pages of *Radio Fun*.

That's 12 issues of the only ham radio magazine that is geared especially for the newcomer, or any ham who wants to get more fun and excitement out of amateur radio–*Radio Fun*.

Get more fun out of radio with *Radio Fun!*
12 issues-$12.97—CALL 1-800- 677-8838

❑ **Yes! Sign me up right now!** 12 issues of *Radio Fun* for $12.97.

NAME CALL

ADDRESS

CITY STATE ZIP

Payment Enclosed: _____
Charge my: MC _____ VISA _____ AMEX _____

Card Number Exp. Date

Class License ____Year Licensed ____*73* Subscriber ____*QST* Subscriber ____*CQ* Subscriber

Mail to: ***Radio Fun***, P.O. Box 4926, Manchester, NH 03108

Canada add $7.00 plus .70 GST. Foreign add $12.00 surface, $36.00 airmail. Newsstand Rate $18.00
Basic Subscription Rate $14.97. G9501G996

NEVER SAY DIE

Continued from page 4

needed. Well, we're a little behind on that one. I remember HB9RF doing that in Zurich over 20 years ago as we were driving to visit his moonbounce station.

I've replaced what was only 10 years ago a state-of-the-art $500,000 computerized publishing production system with a new Macintosh $50,000 desktop system. It does it better and faster.

Are you still writing by hand? You're two generations behind. I changed to typewriters as soon as I could, carrying portables with me on my trips 35 years ago. Then I changed to word processors, moving to a laptop system 15 years ago, as soon as the first one was available. I moved from CW to voice in 1939 . . . and from voice to RTTY in 1949. I put up my first voice repeater in 1969. Our pioneering ham HTs and repeaters of 1970 are now used worldwide as cellular telephone systems.

And look what's happened to those crude microcomputer kits we were playing with in 1975! Now we're using micros to replace million-dollar typesetting systems. One of the first ads for the MITS Altair 8800, the first practical microcomputer, appeared in *73*, by the way.

Are you keeping up with technology? As a ham you're expected by the public to be knowledgeable about high-tech. Can you see where technology is taking us? All you have to do to get ahead of the game is know something like that before others do. Joe Sugarman W9IQO figured out that there would be a market for electronic gadgets, so he started selling them by mail as JS&A and made millions. Steve Jobs figured there was a market for a single-board microcomputer, and didn't do badly. Bill Gates figured these micros would need operating systems and parlayed that idea into a few bil.

If you really want to feel bad you can dig out some old issues of *73* and read where I told anyone paying attention about those opportunities at the time. There are just as many opportunities today, if you think in those terms. Steve Jobs started out with nothing but a prototype built by Steve Wozniak. Bill Gates dropped out of Harvard to work for MITS, in Albuquerque, where the action was.

Communications, computers, information and transportation systems . . . all are changing. These changes, in turn, are changing businesses and industry. They're wiping out the need for so many management layers. They're making it possible (and that translates as necessary) to move manufacturing to lower-wage countries.

We're in need of and ready for a major change in education which I expect will generate a few more billionaires. Ditto health care, which is a trillion-dollar industry, and growing fast. How close are you to the change? Close enough to benefit?

Of course this means that you're going to have to actually *do* something. You're going to have to spend time learning and perhaps experimenting. It is pathetically easy to become an expert in a new technology. It just takes an interest and some dedication.

When I heard the first RTTY signal on my 2m receiver I wondered what on earth that was and started asking questions. That lead me to John Williams W2BFD, the grandfather of ham RTTY. I built the circuit he'd developed, bought an old Model 12 Teletype machine from him, and was on my way. I read all I could find, asked endless questions, and experimented. The next thing I knew *I* was the expert and writing the first book on the subject.

In my editorials I'm endlessly pointing out new areas of technology that are wide open for development and which offer great promise for building new businesses. I've been writing recently about cold fusion. I expect this to turn into a trillion-dollar industry within a few years, sweeping some of the pioneers along into billionaires. It'll not only wipe out established businesses that ignore it, but many of the pioneers who don't keep their eyes open to how the field is developing.

Many of the microcomputer pioneers went under because they stopped keeping their eyes on the future and thus weren't sensitive to changes. I tried hard to convince John Roach, the president of Tandy, that the future of personal computers lay in making them with open systems so that third-party firms could support them with software and accessories. Roach wouldn't listen and this cost Tandy tens of billions. It was Roach who was far more responsible for the success of IBM and their PC than IBM was. IBM should give him a medal.

The opportunities are there. They are sitting there just waiting for anyone with the interest to pioneer and reap the rewards. It does take work. It means learning. One thing it doesn't take is much money. Bill Gates didn't have any money when he approached Ed Roberts at MITS with the BASIC interpreter he'd quickly cobbled together. Steve Jobs didn't have the airfare to fly to the Atlantic City computer show with his Apple I prototype in 1976. The two guys who started Electro-Voice started in a garage, just like Jobs and Wozniak.

The question then is: Are you willing to learn? Are you willing to work? Or are you too busy watching ball games on TV or swapping signal reports for QSL cards so you can end up a Silent Key on the ARRL Honor Roll? Instead you could be learning about spread-spectrum communications, data compacting algorithms, or maybe how to load hydrogen into nickel to generate heat, and then start working on ways to control the process and use it for heating systems and to generate electricity.

Presumably, since amateur radio is supposed to be a technical hobby, you have some grounding in electronics. That's a good start, but why stop there? Oh well, it's your life. If you're already making enough money, don't have any interest in helping civilization progress, and don't get fun and excitement from pioneering, then sit back with a beer and pretzels and enjoy. Let others develop better foxhunting receivers. Let others put up crossband repeaters. Let others run your local radio club. Let others elmer newcomers. Let others develop better, faster packet systems. Let others write the articles you're reading.

Speed Reading

One of the better moves I've made in life was in taking a speed reading course at the local high school. Before that I was bumbling along at a crummy 300 words per minute, reading word by word, just as they taught me in school. At that speed there would be no way I could handle the homework that I need to do to keep up these days. As it is I zip through over a hundred magazines a month, lord knows how many letters and submitted articles for my magazines, plus two or three books a week. Very few novels, either. Well, I *do* read each new Tom Clancy book when it comes out. There goes Wayne, bragging again, right? No, my point is that I haven't done anything you couldn't do . . . if you'd just *do* it.

There are undoubtedly some fine computer programs to help you speed up your reading, but you don't need 'em. The process is really simple. It's like learning the code in that no amount of slow reading is going to speed up your ability to read. If you want to read faster, what you have to do is start pushing yourself. If you don't want to read faster, why not? There's no downside, and the upside can be amazing. It's easy to triple or quadruple your reading speed. And the surprising part is that the faster you read, the more you retain. That's right, comprehension improves!

Instead of reading one word at a time, push yourself to read two and three. Push harder. Then go to four and five. Pretty soon your eyes will be seeing a whole line at a time and you'll be reading by running your eyes down the middle of a column of text. You'll be able to whip through fiction like a breeze. Technical stuff is slower, of course.

Before you start pushing, measure your current reading speed, so you'll know how well you're doing. Pick a full page of text and time yourself. After you've been pushing to read faster for a few days, pick another page and test again to see how much speed you've picked up. I think you'll be pleased. Keep right on pushing and let me know how you're doing.

Make Some Money

I recently got one of these new-fangled HTs with multiple-use buttons. Now, I'm no newcomer to HTs. I started out with an HT-220 Motorola unit back in 1969. That was a very nice, rugged, and compact HT. It had one frequency and was crystal-controlled. It was on 34-94 and worked like a champ. It had a squelch control with the on-off switch on it, a volume control, and a simplex-duplex switch. Period. I had no problem at all using it.

So here I am with this new two-band HT. It's got 24 buttons, two concentric control knobs, a tuning dial, and a 60-page instruction manual. Then there's the fuction display with 25 different areas for information. It's got 64 programmable channels and I know I'm going to need to be retrained after every coffee break.

Sure, I'll probably be able to sweat my way through the 60 page book and figure out how to do the simple things, but the lesser-used functions will go the old use-it-or-lose-it route in what's left of my memory. Heck, this HT has a better memory than I have. Maybe I need a crib sheet. That's what I've cooked up to help me cope with my Mac PowerBook laptop computer. But then it's got about a 500-page instruction book, plus another 500 pages for Word, the word-processing program I use.

Both of those books are so complicated to deal with that several publishers are selling simplified instructions for the computer and the program, and those books run at least 500 pages. I've been buying more and more books to help me cope with this tiny monster, and I've over six feet of bookshelves filled so far, with no end in sight. My wife Sherry, who's been Macintoshing it several years longer than I, has over 50 feet of software and books.

I hate to think what I'll have to do if I move from Word to Quark for page design. Sure, I'll be able to do a lot more, but at what cost in time and aggravation to beat my way through instruction books which are not user-friendly? It's no wonder they're selling video tape instructions for these programs. And I get ads in the mail for one-day courses in Quark for a couple hundred dollars.

One major problem is that most of these books have been written by hardware or software engineers, not writers. One of the great charms of the original TRS-80 Radio Shack computer was that the instruction manual was easily understandable. I just wonder if there might not be a market for simplified ham gear instructions. I know I'd buy 'em in a flash.

Many ham manufacturers are still letting their engineers write their instruction manuals, despite my warnings in past editorials about never letting an engineer get close to such a project. Just as they shouldn't be let near any advertisment writing. Engineers have their function . . . to design equipment. Technicians fix it. But when you need writing done, get a writer. Engineers have their own language, often not recognizable as English. Many seem to almost completely lose their ability to communicate in English through disuse.

If you know how to write, and you've conquered some popular piece of ham gear, you might try your hand at writing a simplified instruction manual for it. If I'm able to understand it, I can offer photocopies via Uncle Wayne's Bookshelf

MFJ-949E *Deluxe* 300 Watt Tuner

More hams use MFJ-949's than any other tuner in the world! Why settle for an imitation when you can have the real thing?

In Stock at ham dealers everywhere!

Pick one up at your favorite dealer -- no shipping, no waiting, no hassles

MFJ-949E

$139.95

Call your dealer for your best price

Includes FREE AC adapter for meter light

More hams use MFJ-949's than any other antenna tuner in the world!

Why? Because the world's leading tuner has *earned* a worldwide reputation for being able to match just about anything.

MFJ-949's have been highly refined and have years of *proven* reliability -- all from the world's most trusted name in antenna tuners.

Now the latest MFJ-949E gives you even more features and more value than ever at a new lower price.

Every MFJ-949E comes with . . . proven reliability . . . MFJ's famous one year *No Matter What*™ unconditional guarantee . . . first-rate performance . . . unbeatable quality. Plus, you get the very best tuner value in ham radio.

Why take chances with an imitation when you can have the *real thing* from the world's most trusted name in antenna tuners.

Why take chances?

Why take chances with an imitation when you can have the* real thing *from the most trusted name in antenna tuners?

More reasons why more hams use MFJ-949's than any other antenna tuner in the world . . .

Full 1.8-30 MHz Operation

1000 volt tuning capacitors, extra heavy duty inductor switch, Teflon® insulating washers and proper L/C ratio gives you arc-free no worries operation.

You can tune any transceiver, transmitter or receiver with up to 300 watts of RF power from 1.8 to 30 MHz.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle Meter shows you SWR, forward and reflected power *simultaneously*. It reads both *peak* and average power on 300 or 30 watt ranges.

The meter is illuminated for easy reading in dim light and has an ON/OFF lamp switch. The meter lamp uses 12 VDC or 110 VAC. A *free* AC adapter is included at no extra cost.

Tunes *any* Antenna

The MFJ-949E tunes out SWR on dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas . . . nearly anything!

Use coax feed, random wire or balanced lines. Has oversized *heavy duty* 4:1 balun.

Super Antenna Switch

MFJ's 8 position *super* antenna switch lets you select two coax fed antennas, random wire/balanced line or built-in dummy load for use through your MFJ-949E or direct to your transceiver.

MFJ's Cross-Needle SWR/Wattmeter is always active for monitoring forward and reflected power and SWR.

QRM-Free PreTune™

MFJ's *QRM-Free PreTune*™ lets you pre-tune your MFJ-949E off-the-air into a built-in dummy load without causing QRM.

Pre-tuning into a dummy load makes tuning your actual antenna faster and easier.

Full Size Dummy Load

MFJ's 300 watt 50 ohm dummy load makes tuning up your transceiver and pre-tuning your antenna easy. It reduces needless QRM and saves your finals.

You'll find it handy for testing and repairing your rig, setting power level, adjusting your mic gain and more.

The MFJ-949E has a *full size* non-inductive dummy load measuring 3/4 inch diameter by 5 inches. It *easily* handles 300 watts of abusive tune-up power.

Watchout for cheap midget size dummy loads that changes resistance as it heats up -- marginal ones could burn up your rig.

Custom Inductor Switch

The inductor switch is the most likely component to burn up in *any* antenna tuner.

The inductor switch in the MFJ-949E was *custom* designed to withstand the extremely high RF voltages and currents that are developed in your tuner -- it's not a flimsy *plastic* switch made for small signals and wired with *tiny* gauge wire.

Unbeatable Quality *. . . built to last*

Each MFJ-949E cabinet is chemically treated and has a new tough scratch-proof *vinyl* cladding -- not paint that can scratch or chip off. You won't find a tougher, longer lasting finish anywhere.

Detailed logging scales and legends are *permanently* silk screened on a *real* aluminum front panel and back panel -- it's not merely a plastic decal or glued-on paper strip that can peel off.

Superior construction -- MFJ-949Es use Teflon® insulating washers, counter sunk screws for meter bracket, *real* binding posts, wing-nut for ground post.

No Matter What™ Guarantee

Every MFJ-949E is backed by MFJ's famous one year *No Matter What*™ unconditional guarantee. That means we will repair or replace your MFJ-949E (at our option) *no matter what* for a full year.

Others may give you a *limited* warranty on defects in material and workmanship.

But what do you do if it burns up and they say, "Sorry, your *limited* warranty does not cover that?"

Continuing Service

Only MFJ gives you a *direct* toll-free technical help line -- not merely a sales line. It's answered by *electronic technicians* who are experts in antenna tuners. We're here to help keep your MFJ product performing flawlessly -- no matter how long you own it.

Just call our toll-free 800-647-TECH (8324) -- no other tuner manufacturer gives you a *direct* toll-free help line.

Call your dealer for your *best* price

In stock at ham dealers everywhere!

Order your MFJ-949E today or simply pick one up at your favorite dealer or hamfest -- no shipping, no waiting, no hassles.

Free MFJ Catalog

Write or call toll-free . . . 800-647-1800

Nearest Dealer/Orders: 800-647-1800
24 Hour FAX: (601) 323-6551
Technical Help: 800-647-TECH (8324)

MFJ ENTERPRISES, INC.
P. O. Box 494, Miss. State, MS 39762
(601) 323-5869; 8-4:30 CST Mon.-Fri.
76206.1763@compuserve.com

MFJ . . . making quality affordable

Prices and specifications subject to change without notice. © 1994 MFJ Enterprises, Inc.

CIRCLE 86 ON READER SERVICE CARD

and see how it sells. Who knows, you might be able to generate enough cash to buy more equipment and then provide understandable instructions for that.

Legacy

In a hundred years what will there be around to show that you've been here? Probably the only thing will be your grandchildren and their children. So much for your life's work . . . all the money you've made, and your lifestyle. Sure, a few people leave noticeable things behind. Music, or some sort of art . . . maybe a bridge or a building they designed. But for most of us it's our children that are a record of our having been here.

Nature has gone to a lot of trouble to make sure that we generate children, so it's an almost sure thing that we will. But since this will probably be the only long-term reminder that you ever existed . . . except perhaps for a gravestone, which I doubt will get a lot of attention a hundred years from now . . . shouldn't you maybe spend some time and effort making sure that your progeny are the best that you can turn out? And no, this is not a trivial project. However, considering its importance, perhaps it's worth investing some time and effort in it. Or is it already too late for you?

No, I'm not going to go into detail here on how to have the best possible children. There's nothing simple about it, and our present customs and life styles are so destructive as far as this goal is concerned, that you may not even want to know. We're permanently lousing up our children even before conception. Then we're doing another number on them during the nine prenatal months. That's followed by an even worse approach during their first year, followed by (ugh) pre-school. The products of these botches are then fed into one of the worst school systems in the developed world. Is that what you want to leave as your legacy? It's no wonder we're up to here in lawsuits, crooked politicians, crime, drugs, welfare, and other such scams.

Yes, I'll try to make time to start writing a book on how to give your children the best send-off in life you can . . . preconception, prenatal, birth, the first year, pre-school, K-12, and then college. If it's too late to help you with your children, maybe it isn't too late for your grandchildren.

If there is such a book I haven't seen it, so I'll have to go into detail on each step, ending up with a "How To Have and Raise An Outstanding Child" manual, complete with repair instructions when mistakes are made.

Most of the information I've gotten has been the result of my research into education and health care for the New Hampshire Economic Development Commission. I sure wish I'd known about all this when I was getting my children started.

Anomalies: The Awesome Power of the Mind

How well have you been keeping up with technology? Science has been moving along at an ever-increasing rate. Has this been leaving you behind? How well do you understand quantum theory? How about Chaos theory and fractals? How about DNA, genetics and the genome project? How about the Big Bang, plate tectonics, and the Omega Point? How about bioelectrics and bioelectromagnetism? How about cold fusion? As a licensed radio amateur . . . someone supposedly educated in electronics and communications . . . shouldn't you be keeping up with the world of science?

And how do all of these recent theoretical developments tie in with ineffables such as precognition, ESP, psychokinisis, faith healing, placebos, ghosts, reincarnation, past lives, UFOs, auras, psychic surgery, near death experiences (NDEs), out of body experiences (OBEs), and so on? Are all of these the "swamp gas" the professional debunkers (aka skeptics) claim? It seems logical to me that when the same phenomenon is reported by many people who have had no way of knowing that others have reported these experiences, that it's worthy of serious investigation and calls for an explanation . . . no matter how unusual the experiences.

If you've been keeping up, as scientists have delved deeper into quantum theory, they've been faced with some very serious problems. Matter no longer behaves rationally when you get down below the atomic level. Physicists have been struggling with a nightmare of ever more particles, often with conflicting behaviors, depending on the group working with them. Newtonian physics doesn't hold any more.

We have some very basic problems we've been ignoring. For instance, we don't know what fields are or how they happen. Oh, we can measure them and predict their effects, but that doesn't mean we know *what* they are. We have electrostatic, magnetic, gravitic, and electromagnetic fields (EMFs) over a wide range of frequencies. We know now that very low frequency EMFs can interfere with cellular growth and communication in living things . . . including people. We can measure gravity fields, but we really don't know what they are. We suspect there may even be more fields which we haven't yet detected.

We know that what we perceive as matter is really energy fields oscillating at certain frequencies. What we don't know is if there might be other forms of "matter" oscillating at different frequencies, and thus might be completely invisible to us, even though we might be right in the middle of it. We can hear a small range of audio frequencies. We can see a very narrow range of light frequencies. We can detect those in be-

35th ANNUAL

TROPICAL HAMBOREE®

AMATEUR RADIO & COMPUTER FAIR
ARRL HAMFEST OF THE AMERICAS

FEBRUARY 4 - 5, 1995

DADE COUNTY YOUTH FAIR & EXPOSITION CENTER
S.W. 112 AVENUE & CORAL WAY (S.W. 24 ST.)
MIAMI, FLORIDA
• Sponsored by Dade Radio Club of Miami, Inc.

• PROGRAMS & ACTIVITIES FOR EVERYONE • 200+ EXHIBIT BOOTHS • 800+ INDOOR SWAP TABLES
• TWO ON-SITE LICENSE EXAM SESSIONS • FIELD CHECKING FOR DXCC AND CQ AWARDS
• INTRODUCTION TO AMATEUR RADIO DISPLAY • INTERNATIONAL AMATEUR RADIO PRESENTATION
• FORUMS ON FCC, AMSAT, ARRL, QCWA, DXPEDITIONS, ANTENNAS, PACKET, TRAFFIC, ARES
• ALTERNATE INTEREST PROGRAMS ON CRAFTS, PERSONAL APPEARANCE, HEALTH & NUTRITION

ON-SITE CAMPING FOR 300 RVs • FREE PARKING FOR 15,000 VEHICLES

Registration: $5.00 Advance (deadline Jan. 31st) — $7.00 Door
Campsites: 3 days (Fri., Sat., Sun.) $45.00, 4 days (Thur., Fri., Sat., Sun.) $60.00
Swap Tables: $25.00 each* plus reg. ticket • Power: $10.00 per user.
*CALL OR FAX FOR SWAP SPACE AVAILABILITY BEFORE SENDING IN TABLE RESERVATION.
(Prices quoted for tickets, tables & camping include Fla. & Dade Co. tax)

Headquarters Hotel: Miami Airport Marriott - $70.00 Single, Double + Tax. Tel. (305) 649-5000 - Speak Only to Reservation Department and MUST mention "Tropical Hamboree" to get special rate. Deadline Jan. 20, 1995.
Alternate Hotel: Holiday Inn LeJeune Center - $70.00 Single, Double + Tax
(Complimentary Drink Coupon upon check-in) — TOLL FREE TEL: 1-800-428-9582.
Speak to Reservation Dept. and mention "Tropical Hamboree." Deadline Jan. 20th

TICKET, CAMP, TABLE PAYMENTS **PAYABLE TO: DADE RADIO CLUB OF MIAMI, INC.**
Mail to: Evelyn Gauzens, W4WYR, 2780 N.W. 3 St., Miami, FL 33125-5059
BOOTH & TABLE INQUIRIES: Call 305-642-4139 or Fax: 305-642-1648

CIRCLE 50 ON READER SERVICE CARD

tween and use many for communication. But those are electromagnetic waves. Detecting gravity "waves" is much more difficult.

We tend to be arrogant about what we know. You've probably read about the head of the Patent Office who proposed closing it down about 90 years ago on the basis that everything fundamental had already been discovered. The patent office today has refused to issue any cold fusion patents because there are a few well-placed scientists stopping the process.

From my point of view anomalies . . . those things which are reported by people in many parts of the world, but which are not yet explainable in scientific terms . . . indicate that we've still a long way to go before we really understand our world.

I've editorialized in the past about memory. I've mentioned that under hypnosis people can be regressed to any instant of their lives and recall in total detail what was being sensed at the time. Every face in a crowd is recorded in some way. Every word on every page we've ever glanced at. Unfortunately we're programmed by our parents from early childhood not to be able to access most of these memories.

But we run into a physical problem. How can so much material be stored just in the brain? No mechanism has yet been discovered which can handle the sheer bulk of information we're able to store. I've suggested that perhaps it isn't stored on a molecular basis like a computer, but in some other kind of medium entirely. A controversial new theory has been proposed which is in line with this concept, plus it ties together many anomalies which have been bothering me, into one completely new paradigm.

Scientists have been at a loss to explain why people who've had large parts of their brains destroyed or removed can still have all of their memories. How can 90% of the brain be removed without a loss of memory? It doesn't make any sense. Well, not if you insist that the brain is the mind and that it's wholly a physical, molecular thing, much like a computer. And that gets worse when you find another person with a different 90% of the brain removed, and still without a loss of memory. Whoops!

And what about the thousands of people who can see auras around people? What about people who can accurately diagnose illnesses just by looking at these auras? At times we get hints of some amazing latent potentials we all seem to have. We have people who have demonstrated abilities under strict scientific controls which suggest that, if we only knew how they did these things, we might be able to learn how to do them too.

Perhaps, instead of spending millions on disease research we might invest in learning how the mind works and prevent disease from that end. We know that there is a psychological component to every illness. We also know that our current medical approach is to completely ignore this key factor and try to treat the resulting illness symptoms . . . preferably with drugs.

Our pharmaceutical companies spend an average of $230 million for every new drug they bring to the market. I suspect that if there was some way to channel the cost of one new drug into mind research we might not have much use for drugs any more. And that's the real problem with this approach. The pharmaceutical industry is making hundreds of billions selling drugs . . . which is why they don't mind investing a couple hundred million bringing a new drug to market, or even spending over a billion dollars a year on advertising. But if removing the psychological component which has triggered the illness is possible, these businesses could quickly dry up and blow away. It's worth a few billion to make sure that doesn't happen, so the possibility of either a commercial firm or the government venturing into this field of research is much less than even remote.

The so-called health care industry has too much at stake to even chance this approach working. It's actually a sickness-care industry and it's one of our largest American industries. What would happen if someone discovered how to remove the psychological triggers making people sick? That would put most of our doctors, nurses, hospitals and so on out of business. It probably would even prolong life, working a severe hardship on our death industry too.

I've explained how the mind works. I explained that painful experiences set up neuron networks dedicated to helping you avoid repeating the pain in the future. I also explained that these subconscious forces have an incredible effect on our daily lives. And I explained that it's not just possible, but fairly easy to dissolve these networks. I've had a few letters asking for further information on doing that, but not enough demand to get me to sit down and tackle the project.

Getting back to a new approach to eliminating illness, you've probably read about how successful many non-medical doctors have been. Witch doctors, shammans, medicine men, Christian Scientists, and so on have been doing remarkably well, some for thousands of years. If they didn't have a fair percentage of successes they wouldn't have lasted.

When we look at people with multiple personalities we find some fascinating things going on. Most multiples have six or more personalities, each quite different. These seem to be a survival reaction to very painful childhoods. The interesting thing is that some of the

TOLL FREE 1-800-666-0908 PRICING AND ORDERS ONLY

YAESU

FT-11R

FT-840

NEW!

FT-900AT
Compact HF Transceiver
Remote Front Panel Design

FT-2200
NEW!

FT-530

FT-2500M

FT-1000

FT-990

FT-5100
FT-5200

FT-890AT

CALL FOR ALL YAESU RADIOS & ACCESSORIES

NEW EQUIPMENT PRICING AND ORDERS 1-800-666-0908 OUT OF STATE
TECHNICAL, USED GEAR, INFO 203-666-6227 24HR FAX 203-667-3561

Hours:
M-F 10-6,
SAT. 10-4

LENTINI COMMUNICATIONS INC.
21 GARFIELD STREET, NEWINGTON, CT 06111

C.O.D.s OK
Same Day Shipping

CIRCLE 234 ON READER SERVICE CARD

personalities may have diabetes, while others don't. Some personalities may have epilepsy. Often different personalities require different eyeglass prescriptions . . . and some don't need glasses at all. As I say, it's almost enough to make a person think!

Then we get into the power of placebos and realize that many people have demonstrated the ability to recover . . . or die . . . from cancer just on the basis of a belief in some therapy. There are many fantastic cases to prove this.

OK, we already know that every illness has a psychological component. And we know that medicine men have been surprisingly successful without the benefit of "modern" medicine. And we know that voodoo and witchcraft can cure or kill, as can placebos. I've mentioned that when I was working professionally as a psychologist I found it fairly easy to discover these illness-triggering factors. The next logical step seems to me to untie the hands of our research people and urge them to go after curing illness via erasing the psychological component of the illness rather than bigger and better medical electronic diagnostic equipment and $230 million each for new drugs to treat the symptoms, but not the causes. Would you say this is so ridiculous an approach that we shouldn't even consider it?

Of course the problem with this is that we have the fox guarding the henhouse. What commercial company is going to spend money trying to discover something that might well put our pharmaceutical companies out of business, yet probably wouldn't bring money in? And perhaps put most hospitals, clinics, doctors and nurses out of business too? There's enough money to be made by bringing a new drug to market to warrant a $230m research investment, but how could anyone make money from a simple instant cure for illnesses? Maybe even for almost every illness?

We've got the teacher's NEA spending tens of millions of dollars on Congress and state legislatures to vigorously guard one of the worst educational systems in the developed world against change. We've got the power utilities guarding against truth in the damage their magnetic radiation is doing to us. The government-subsidized tobacco industry is still denying that there's any real proof that cigarettes cause illness. Imagine what resistance our trillion-dollar "health care" industry would put up if someone suggested there might be a way for us not to get sick.

We know the government isn't going to finance research into an omnibus cure for illnesses. Nor will private companies. So it looks as if we're going to have to live with ever-escalating sickness costs and much shorter, unhealthier lives than are possible. Pity, because I suspect that the solution wouldn't take long to develop.

Maybe you've noticed that virtually every major problem we have in America seems to stem from some action or inaction of Congress. My solution to that impasse is simple: NRA . . . Never Re-elect Anyone. If we can get rid of career politicians we're going to benefit. For every good politician (a contradiction of terms?) we might lose, we'd evict a hundred bummers. My NRA could be the National Recovery Act of the '90s.

What have you to gain? Better and cheaper health care, infinitely better education, no more welfare, taxes reduced by at least 50%, a far smaller bureaucracy, a 90% reduction in crime, and things like that. It's up to you to choose which you prefer.

The Helicobacter Pylori Syndrome

If you don't read *The New Yorker* you are missing out on a lot of good stuff. Oh, not in every issue, but enough to make a subscription well worth while. For instance, last year they ran a great article in their "Annals of Medicine" series on a doctor who suspected that ulcers weren't caused by stress, but by a germ called Helicobacter Pylori, and not by emotional problems or stress.

Despite enormous pressures from the medical establishment, which did all it could to prevent him from doing research, and then from publishing his findings, he eventually prevailed. Now most doctors accept his work.

And *The New Yorker* also was the first to publish Paul Brodeur's material on power line fields and their effect on people, which to many people who have not bothered to read much about this, is still controversial. Of course, to the cigarette companies, the harm their product does is still "controversial." But, as they themselves have been quoted as saying, their product is used by the young, the blacks and the stupid. Or did you skip watching that well-done TV report on smoking?

All too often we've seen this happen in many scientific fields. If you can get away for a few days, see what you can do to attend the Tesla Society Extraordinary Science conference in Colorado Springs. I went last year and I'll be going again next. Sure, they have some absolute crackpots presenting papers there. But they also have some well-researched papers that might just get you to thinking. Check with the International Tesla Society, Box 5636, Colorado Springs, CO 80931. Quite a few hams attended last year, and they even had a conference ham station set up and running . . . and leaking sideband into their public address system.

The Subtle Energies conference (ISSSEEM) is another conference worth attending. They are much more picky about the papers presented than the Tesla group. I attended their conference last year and found the presentations well researched. But you'll have to be prepared to hear papers on energy medicine, auras, and so on. I was particularly impressed by a video of a psychic healer influencing a cloud chamber on cue from several hundred miles away. And also changing the surface tension of water remotely. This is where you'll learn more about light therapies, bioelectromagnetics, and so on. You can get more info on this from ISSSEEM (the International Society for the Study of Subtle Energies and Energy Medicine), 356 Goldco Circle, Golden CO 80401. Tell 'em Uncle Wayne sent you. If you're there next time we can sit together and discuss what we're hearing. I was the only ham there last year. Tsk.

As I've mentioned, we still have an enormous number of things to learn about our world. We're still blundering around trying to understand how atoms work. We haven't a good understanding of any fields yet, including magnetic and gravity. We don't understand how electricity flows, or what electrons are. We're still trying to understand inertia and time. Sure we have equations for all these things, but we just know how they work, not why.

I suppose you were too busy watching some stupid sitcom instead of the wonderful PBS series on psychology. I don't know, you discourage me sometimes.

And then I get letters from readers who've been reading the books I've recommended, and I am encouraged. Quite a few have sent me wonderful letters telling me how much they've gotten from Becker's *Cross Currents*. While I try to answer any questions readers ask, I generally don't write back unless there are questions, so I'd like to take this opportunity to thank the many readers who've bought my *Declare War* book and enjoyed it.

Now, what will it take to get you involved in doing some research and development? Wait'll you see what happens when you plant a row of seeds which have been treated in different ways before planting! I got a call from a reader the other day who has been treating seeds so they turn out humongous plants, vegetables and fruits. Forty-foot corn plants with 12" diameter corn cobs? Well, that's what he said. But then he's a big believer in Wilhelm Reich's orgone. Yes, I've read Reich's book, *The Discovery of the Orgone*. It came close to making me a believer. That close.

So what happens to seeds germinating over the north or south poles of magnets? Or over positive or negative electrostatic fields? In different colors of light? In magnetic fields of different frequencies?

Knowing how badly the scientific establishment has treated new discoveries in the past, I wasn't surprised at the shabby treatment Pons and Fleischmann got when they announced their discovery of the cold fusion phenomenon. Well, as they say, "Time wounds all heels."

So, have you read about Heliocobacter Pylori? If not, you aren't doing your basic homework. 73

To subscribe to *73* call 800-234-7373. Don't miss a single issue!

- Packet Radio -
Portable & Affordable!

Model BP-1
Packet Modem
Made in U.S.A.

★ Simple Installation
★ No External Power
★ Smart Dog™ Timer
★ Perfect For Portable
★ Assembled & Tested
★ VHF, UHF, HF (10M)

Whether you're an experienced packeteer or a newcomer wanting to explore packet for the first time, this is what you've been waiting for! Thanks to a breakthrough in digital signal processing, we have developed a tiny, full-featured, packet modem at an unprecedented low price. The BayPac Model BP-1 transforms your PC-compatible computer into a powerful Packet TNC, capable of supporting sophisticated features like digipeating, file transfers, and remote terminal access. **NOW** is the time for **YOU** to join the **PACKET REVOLUTION!**

Just... **$49.95** +Shipping

Tigertronics Incorporated
400 Daily Lane
P.O. Box 5210
Grants Pass, OR
97527

1-800-8BAYPAC
1-800-822-9722
(503) 474-6700

CIRCLE 269 ON READER SERVICE CARD

An 80/40/30m Tripole

Continued from page 40

might expect, but gives me really quite good coverage N-S as well! I tend to run between QRP and low power most of the time, and have no trouble with Michigan and Canada to the North, the Gulf states, the Caribbean, and South America to the south. East and west to the coasts is about it so far in the eight months or so the latest model has been up, but I have a good feeling that Europe, Africa, Asia are not in any "dead zone" for the antenna—I am just not on enough hours, or the right hours, to have worked them. Remember, propagation either gets or helps you to the N-S, but time zones alone can kill you to the E-W. California to Europe on the 40 & 80 meter bands must be murder. By the time those bands come alive at night in California (terminator passes into darkness), Europeans are sound asleep! Life just is not fair (well—not easy, anyway).

A friend has come up with the possible reason that the antenna works so well on 160m, even without the tuner: The 86' of coax feeding it works out to be right at 1/2 wavelength at the 160m frequencies I have been using! Since I ran directly into the antenna with no balun or any kind of ferrite beads or rolled up coax to form a choke at the antenna input, the odds are quite good that the feedline is making up a portion of the radiating antenna. If that were the entire case, I would buy it in a minute, but the contacts so far seem to indicate that 160m use favors E-W, and if the coax were radiating (remember, it runs from ham shack East to antenna) I would think N-S would be favored on 160m. Whatever, it works really well and somewhat omnidirectionally on the three bands I built it for, and it sure is not too shabby on the extra 160m band!

It would not be fair to tell you that from the FT-990 into the antenna on *all* four bands, the SWR is absolutely FLAT, with very little work by the built-in antenna tuner in the radio; were it not for the fact of so many radios now having the tuner built in, and/or so many fine tuners being available at very reasonable prices. I never favored letting the tuner do the work we should do when building the antenna, if for no better reason than that even with a tuner you are *not* getting best antenna efficiency if the tuner does the work. The ideal is to have the antenna *flat*, a good 50 ohm match, and look good *before* the tuner is ever used. Tuners are good guardians for radios when we *have* to tune and load into wet noodles like Field Day or during emergencies.

Finishing Touchs

I'll leave you with a few tidbits for those of you diehard antenna types like me. I did all the cutting, trying, and measuring with very reasonably-priced MFJ antenna gear. I used the MFJ Antenna Bridge 204B in developing the antenna, and the MFJ SWR Bridge 249 in trying to grade and classify it. Both served me well I think, considering the very good results (contacts) I have been able to make. It is *not* a full-size yagi or quad on any of those bands, but it *is* a classy set of dipoles that build up easily and work well.

One thing that may help you that came as part of the directions for the MFJ gear is an approximation formula that should work well for any type of accurate SWR bridge. You use the idea by first noting the design center frequency (desired). If you are using an SWR bridge *please* use very low power while doing these tests—for the rig's sake, and for the sake of the others on the bands as well. Once everything is up in the air (mine is right at 24' at both the apex and the ends—*not* terribly high), then take SWR readings over a spread of a band (starting with 80M). If you are unlucky enough to be off as to where you want the SWR to be best (design center frequency), then the following can save you a lot of time. Enter the formula and use from the MFJ book.

Credits:

Ideas for multiband dipoles with common feeds came from "Short 80 through 10 Meter Band Ham Antenna," by Richard A. Yommus W2DMK, *Popular Electronics* magazine, April, 1973.

Simple Novice and wire antenna ideas came from "Novice Antenna Specials," by William E. Hood W2FEZ, *73 Magazine*, date unknown.

Some ideas about cages, spacers, band-sharing common feedlines came from "The Extreme Basics of Antennas," by Robert M. May II WA4DBG, *73 Magazine*, date unknown.

BATTERIES

BUY DIRECT FROM US, THE MANUFACTURER

MasterCharger® I & II

By simply changing adaptor cups, the MasterCharger will charge any Yaesu, Motorola, Icom, Kenwood, Alinco, etc. 2-Way Radio Battery

SPECIAL

FOR THE MONTH OF JANUARY

10% OFF

on all CAMCORDER Replacement Batteries

LOOK FOR FEBRUARY'S SPECIAL OF THE MONTH

MONTHLY DISCOUNTS APPLICABLE TO END-USERS ONLY

MasterCharger®1+1

Electrically Identical to MasterCharger I

If you have two different radios you'll only need one charger to accomodate both radios. Now by simply switching the switch to the left or right, you can determine which charging cup to activate.

NYS residents add 8.5% sales tax. Add $4.00 for postage and shipping.

Prices and specifications subject to change without notice

W & W ASSOCIATES

800 South Broadway, Hicksville, NY 11801

In U.S.A. & Canada Call Toll Free 800-221-0732

In NY State Call (516) 942-0011 • Fax (516) 942-1944

World Wide Distributorships Available, Please Inquire

MADE IN THE U.S.A.

SEND FOR FREE CATALOG AND PRICE LIST

CIRCLE 191 ON READER SERVICE CARD

Number 25 on your Feedback card

NEW PRODUCTS

Compiled by Charles Warrington WA1RZW

ARRL

The American Radio Relay League has announced publication of the 1995 *ARRL Handbook for Radio Amateurs*. Now in its 72nd edition, the *Handbook* is considered an authority on technical matters for amateurs and others interested in communications technology. More than 6 million copies have been sold since 1926.

The 1995 edition has been entirely rewritten and contains material superseding all previous editions. New chapters provide a snapshot of amateur radio in the '90s.

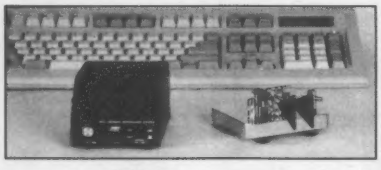
The *Handbook* is available at your favorite dealer or bookseller, including "Uncle Wayne's Bookshelf" on pages 86-87. Or contact *The Amateur Radio Relay League, Inc., 225 Main Street, Newington, CT 06111; (203) 666-1541.* Or circle Reader Service No. 202.

PLANNED PRODUCTS

Planned Products has introduced two new greases developed for applications requiring electrical conductivity, lubrication, and protection. Available in silver and carbon formulations, the new Circuit Works Conductive Greases protect assemblies from wear and from environmental hazards while providing excellent electrical and thermal conductivity.

When used at low to medium speeds, the 7100 Circuit Works Silver Conductive Grease, and 7200 Circuit Works Carbon Conductive Grease lubricate and protect assemblies while forming conductive pathways, contacts, connections, static drains and grounding. Based on advanced silicone lubricants these new greases are chemically inert, thermally stable and nonflammable. Assemblies are protected from moisture, oxidation, radiation, corrosion, and corrosive atmospheres with a single application.

For more information or to order contact *Planned Products, 303 Potrero Street, Suite 53, Santa Cruz, CA 95060-2760; (408) 459-8088, FAX (408) 459-0426.* Or circle Reader service No. 203.



MFJ

MFJ Enterprises has introduced the MFJ-452 Super CW Keyboard, including a two-line LCD display and RFI Supressed Keyboard. This product includes plenty of features and accessories you may not expect to see.

The MFJ-452 features eight 250-character nonvolatile message memories, a 150-character type-ahead buffer, an iambic keyer, and a powerful Morse Code Trainer. Simply turn this unit on and you're sending effortless CW—no computer to boot-up, no program to load. The Perpetual Memory means you can save messages and settings for 20-years without power or batteries.

The MFJ-452 includes a speaker, sidetone, volume control, and jack for external speaker or earphones. The MFJ-452 is priced at $129.95; the MFJ-452X is the exact same model without the keyboard, priced at $99.95. For more information or to order contact *MFJ Enterprises, Inc., P.O. Box 494, Mississippi State,MS 39762; (601) 323-5869, FAX (601) 323-6551, (orders) (800) 647-1800.* Or circle Reader Service No. 206.

CAIG LABORATORIES

Caig has introduced an environmentally safe aerosol for its ProGold product. ProGold is a high performance contact cleaner, enhancer, and lubricant that needs no carrier solvents for dilution or cleaning surfaces. The spray container provides short bursts of 100% concentrate via a precision metered valve.

The unique properties of ProGold allow it to deoxidize, clean surface contamination, and penetrate plated surfaces to molecularly bond to base metals—no other product does this. It fills the gaps in the contact surfaces to increase the effective contact area and prevent current concentration at surface peaks.

The result is current is distributed more evenly across the contact surfaces. This increases conductivity and contact surface area and reduces arcing, RFI, wear, and abrasion (the major cause of intermittent signals, distortion, and signal loss). For more information contact *Caig Laboratories, Inc., 16744 West Bernardo Drive, San Diego, CA 92127; (619) 451-1799, (800) CAIG-123, FAX (619) 451-2799.* Or circle Reader Service No. 201.

CUSHCRAFT

The new Cushcraft ASL-2010 Skylog Log Periodic antenna is the answer for hams who would like to have a single antenna that covers 10 meters through 20 meters (actually 13.5 through 32 MHz). This design eliminates the need for two Yagis to cover the traditional bands and 12 and 17 meters.

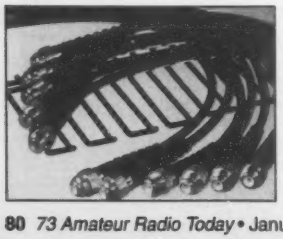
It uses single feed line (balun included) and thus there is no need to switch antennas when changing bands. This design does not use any traps of any type thus the wind load is reduced significantly (10.1 sq. ft.). The antenna is not power limited and will easily operate at full legal limit continuously.

The ASL-2010 boom is 18 feet (5.48 meters) long. The gain of the antenna is 6.4 dBd. Construction is of weatherproof aluminum and stainless steel. List price is $800. For more information contact *Ken Albertson, Cushcraft Corporation, P.O. Box 2680, Manchester, NH 03108; (603) 627-7877, FAX (603) 627-1764.* Or circle Reader Service No. 204.

RAYMOND SARRIO

Hams interested in generating community awareness will be excited by these new T-shirts from Ramond Sarrio Company. These eye-catching shirts feature a 4-color design that clearly communicates that amateur radio provides an essential public service when disaster strikes. There is also a circular 2-color logo on the left chest that states, "Amateur Radio—Dedicated to Public Safety." The sweatshirts have the 4-color "WHEN ALL ELSE FAILS" design on the front.

To help amateur radio clubs, a special fund raising program has been implemented: Clubs, without stocking any inventory, can earn up to $6 on each T-shirt and up to $8 on each sweatshirt they sell. ARCs can also have their club name or logo printed onto these shirts. All shirts come with a 30-day no questions asked guarantee. T-shirts are priced at $14.95, sweatshirts $26.95 plus S&H (CA residents add 7.75% sales tax). For more information or to order contact *Raymond Sarrio WB6SIV, 6147 Via Serena St., Cucamonga, CA 91701; (orders) (800) 413-1129, (info) (909) 987-1020.* Or circle Reader Service No. 205.



RF INDUSTRIES

With RF Industries' new Unicable Kit, you can now mix and match any combination of connectors or adapters to the ends of a 48" cable assembly. Covered in a soft PVC matte blue jacket with matching molded strain reliefs, these cable assemblies are flexible and easy to handle. This extra flexible RF-58A/U type 50 ohm cable with 95% double shielding (tinned copper braid over aluminum foil) is 48" long. Unidapt universal connectors at each end feature machined brass, silver plated bodies, gold plated contact, and Teflon dielectric insulators.

Frequency range is DC to 1 GHz; impedance is 50 ohms; insertion loss is less than .2 dB; and VSWR max is 1.2:1 from DC to 1.5 GHz. For more information visit your local dealer or contact *RF Industries, 7620 Miramar Rd., San Diego, CA 92126; (619) 549-6340, (800) 233-1728, FAX (619) 549-6345.* Or circle Reader Service No. 207.

Number 26 on your Feedback card

PROPAGATION

Jim Gray W1XU

Jim Gray W1XU
210 East Chateau Circle
Payson AZ 85541

Well, three out of four weekends ought to be pretty good this month, while the only one expected to be POOR is the 21st and 22nd (third weekend). Weekdays ought to be FAIR to GOOD *except* the 11th through 13th. Really GOOD days ought to be the 4th, 5th and 6th, as well as the 29th, 30th and 31st. Of course, that's not a promise, but pretty close to it! Look at the daily forecast for your planning, and enjoy the holidays.

If the pundits are correct, 1995 could well be the year in which Cycle 22 bottoms out, and if so I expect the low conditions to extend for almost a year . . . sort of a low plateau of sunspot numbers. Naturally, I hope I'm wrong. Tune WWV at 18 minutes after any hour for up-dates on propagation.

10 and 12 Meters

Only occasional F2 openings to the tropics on GOOD days during daylight hours. Not much sporadic E or short skip propagation can be expected. Skip is where you find it, so keep looking and hoping. Sometimes results are spectacular on a supposedly "dead" band. Really good "gain" antennas can help a lot this month. A good local band.

15 and 17 Meters

Fairly good DX into the Southern Hemisphere during daylight hours from noon to sunset *local* time, and short skip from sunrise to sunset, but expect the band to close soon after—abruptly!

20 Meters

Daylight hours should be pretty good for DX this month in spite of depressed conditions in general, and you may even find the band open until midnight. Peaks ought to occur just after sunrise and late afternoon *locally*. If the band does stay open after dark, look for openings into South America and even Antarctica. Also, during the day, you will find considerable short skip. All of which means that 20 meters should be your PRIME DX BAND. (See 80 meters, too.)

30 and 40 Meters

Expect late afternoon and evening openings into Europe and Africa swinging south after sundown for a few hours, but the MUF falls below 7 MHz later in the evening. Short skip will occur during most days out to 1,000 miles or so, and to 2,000 miles at night until the band closes.

For you newer operators who have not lived through a complete sunspot cycle, there will be some great surprises in store. Listen and learn.

80 Meters

This will also be a very good DX band after dark, and since QRN is low, signals ought to be very readable . . . even weaker ones. Peak DX occurs around midnight local time and just before sunrise. Insomniacs will *love* 80 meters this month. Short skip at night will occur frequently out to 2,000 miles. Isn't it interesting how two of our "oldest" bands, 80 and 20, are the best in these times? The old-timers knew what they were doing when they "got" these bands for amateurs way back when.

160 Meters

You "top band" operators will love this band in December: DX openings to the east from your locations, peaking around midnight (Europe, etc.), and toward the south and west before sunrise. Nighttime short skip should also be good from dusk to dawn, getting longer later. On this band, use vertical antennas to transmit and horizontal antennas for receiving, preferably Beverage antennas if you have the room. Low noise and minor static will make you happy. 73

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA							20	20				
AGENTINA	20	40	40	40	60	60				20	15	15
AUSTRALIA	20		20		40	40	20	20			15[1]	15[1]
CANAL ZONE	15	20	20	40	40		20	20	15	15	15*	15*
ENGLAND	20	40	60	40	40		20	20	20	20	20	20
HAWAII	20		20		40	40	60	20			15[1]	15[1]
INDIA	2040					20[1]	40[1]	20[1]				15[1]
JAPAN	20						20	20				20
MEXICO	15	20	20	40	40		20	20	15	15	15*	15*
PHILIPPINES							20					
PUERTO RICO	15	20	20	40	40		20	20	15	15	15*	15*
SOUTH AFRICA			40[1]	40[1]				15	15	15	20	20
U.S.S.R.	40	60	60	40			20	20	20			40
WESTCOAST		60	60	40	40	40	20	20	20			

CENTRAL UNITED STATES TO:

ALASKA							60*	40*	20			
ARGENTINA	20			40	40	40					15	15
AUSTRALIA	15						40	20	20	20		15
CANAL ZONE	20	60	40	40	40	40	20	20	15	15	15	20
ENGLAND	40	40	40	60				20	15	20		40
HAWAII	15	20				40	40	40			15	15
INDIA	15[1]	20[1]	20[1]					40[1]	20[1]	20[1]		
JAPAN							60*	40*	20			
MEXICO	20	60	40	40	40	40	20	20	15	15	15	20
PHILIPPINES								20				
PUERTO RICO	20	60	40	40	40	40	20	20	15	15	15	20
SOUTH AFRICA	20	40*							15	15	20	20
U.S.S.R.	40		40	40				20	20			

WESTERN UNITED STATES TO:

ALASKA	15	20			40	40	40	40	40			20
ARGENTINA	15	20		40	40	40	40	40		15	15	15
AUSTRALIA	15	20	20				40	60*	40	15	15	15
CANAL ZONE	20	20		40	40	40			20	15	15	15
ENGLAND			60*	40					20	20		
HAWAII	15	15			20	20	20	20				15
INDIA		20										
JAPAN	15	20			40	40	40	40	40			20
MEXICO	20	20		40	40	40			20	15	15	15
PHILIPPINES	15	20					40	40		20		20
PUERTO RICO	20	20		40	40	40			20	15	15	15
SOUTH AFRICA	20	40[1]	40[1]							15	15	20
U.S.S.R.		40[1]	40[1]	40[1]	40[1]				20	20		
EAST COAST		60	60	40	40	40	20	20	20			

1=May be open only once or twice during month. *=Try next higher band G=Good, F=Fair, P=Poor

JANUARY 1995

SUN	MON	TUE	WED	THU	FRI	SAT
1 G	2 G-F	3 F-G	4 G	5 G	6 G	7 G-F
8 F-G	9 G-F	10 F-P	11 P	12 P	13 P	14 P-F
15 F	16 F-G	17 G	18 G-F	19 F-P	20 P	21 P
22 P	23 P-F	24 F-G	25 F-G	26 G-F	27 F	28 F-G
29 G	30 G	31 G				

Number 27 on your Feedback card

BARTER 'N' BUY

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The 73 Flea Market, Barter 'n' Buy, costs you peanuts (almost)—comes to 35 cents a word for individual (noncommercial) ads and $1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old-timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to the Barter 'n' Buy, *73 Magazine*, 70 Rt. 202N, Peterborough NH 03458, and get set for the phone calls.

The deadline for the March 1995 classified ad section is January 6, 1995.

ALL ABOUT CRYSTAL SETS. Theory and construction of crystal set radios. $9.95 each, ppd USA. Send to: **ALLABOUT BOOKS**, Dept. S, P.O. Box 22366, San Diego CA 92192. BNB200

ROANOKE DOPPLER PC BOARDS $49.95 ea. **AB5CK Tom Lewis**, 6721 Rolling Hills Dr., North Richland Hills, TX 76180; (817) 428-8200. BNB240

DWYER WIND SPEED INDICATOR only $55.00 plus $4.00 S/H. For home or office. Accurate, low-cost, practical. Roof mounted pickup. Send check or M.O. to: **RAD-MON COMPANY,** Dept A, Box 751, Marathon NY 13803-0751. (NY Residents add Sales Tax) BNB285

ATTENTION HAMS! Subscribe to *6-50 Worldwide for Six Meter Enthusiasts*, *DX Digest for DX Chasers*, or *The Novice/Tech Report*. Call (817)694-4047 or FAX (817)694-2522. BNB292

COMMODORE 64 REPAIR. Fast turn around. **SOUTHERN TECHNOLOGIES AMATEUR RADIO,** 10715 SW 190th Street #9, Miami FL 33157. (305)238-3327. BNB295

WANTED: Electron Tubes, ICS, Semiconductors. **ASTRAL,** P.O. Box 707ST, Linden NJ 07036. Call (800)666-8467. BNB307

KENWOOD AUTHORIZED REPAIR. Also ICOM, Yaesu. **GROTON ELECTRONICS,** Box 379, Groton MA 01450. (508)448-3322. BNB310

UNIQUE INDOOR/OUTDOOR ANTENNA gives 30 dB gain on 160m-10m. Plans: $6.95. **BOB CHRISTIE AA2KE,** 215-28 Spencer Ave., Queens Village NY 11427. BNB319

PROGRAMMABLE COUNTER - Works with ANY VFO Rig! Get a digital display for your rig, 100 Hz resolution. You can read the tuned frequency directly, no need to calculate offsets. Counts to 40 Mhz, up OR down. Counter Kit, $69.95; Kit w/case, $99.95; Assembled w/case, $139.95. GUARANTEED TO WORK. For info send SASE: Call/write to order: **S & S ENGINEERING,** 14102 Brown Road, Smithsburg MD 21783; (301)416-0661. BNB334

RCI-2950/2970: New modification manual including Power increase. Clarifier modification. Modulation increase. Operating hints, and more. Parts included. Only $20.00 ppd in U.S. (Missouri residents add $1.15 tax). **SCOTT,** P.O. Box 510408, St., Louis MO 63151-0408. (314)846-0252. Money Orders or C.O.D. BNB340

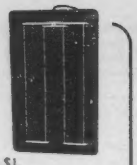
HR2510, RCI2950, CONNEX 3300, COBRA 148, GALAXY SATURN, plus many more kits to increase your modulation, $19.95. **(800)536-0109.** BNB350

QSL CARDS — Standard and custom. Your ideas or ours. Excellent quality. Foil stamping available. Many designs and type styles. Catalog and samples $1.00 refundable. **WILKINS,** Dept. A, Box 787, Atascadero CA 93423. BNB370

NEW NN1G CW SUPER-HET SINGLE BAND TRANSCEIVER KIT. Available in 20M, 30M, 40M, 80M. $59.95 plus $3.75 S/H. (Catalog-2 Stamps). **DAN'S SMALL PARTS & KITS,** 1935 South 3rd West #1, Missoula MT 59801. BNB385

IT'S BACK! The return of the HW-8 Handbook! Second printing. Modifications for the Heath QRP rigs. First class mail $11. DX add $4 for air mail shipping. **Mike Bryce, WB8VGE,** 2225 Mayflower NW, Massillon OH 44647. BNB404

BackPack Solar?



10 watt DesertStorm panel is size of open 73 magazine, weighs 1lb, and delivers 600mA for 12v charging or direct operation. Tough, Solid, with no glass to break. So rugged Uncle Sam used this for spotter communications and portable repeaters in Desert Storm. Ready to use. $169. Add $5 S&H. Info $1.

AntennasWest
Box 50062 Provo UT 84605

Order HotLine
801 373 8425

CIRCLE 340 ON READER SERVICE CARD

CB-TO-10 METERS

We specialize in CB radio modification plans and hardware. Frequency and FM conversion kits, repair books, plans, high-performance accessories. Thousands of satisfied customers since 1976! Catalog $3.

CBC INTERNATIONAL
LOU FRANKLIN/K6NH Owner
P.O. BOX 31500X, PHOENIX, AZ 85046

Sell your product in *73 Amateur Radio Today*
Call Dan Harper today. . . **1-800-274-7373**

SLY LIKE A FOX

NEW

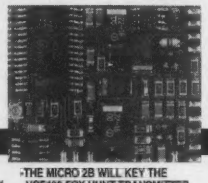
VFC400 FOX HUNT TRANSMITTER/KIT

ONLY $99.95

- SMALLEST 400 MILLIWATT TRANSMITTER (1.5" X .56")
- RELIABLE CRYSTAL CONTROL OSCILLATOR
- LINE LEVEL AUDIO INPUT (1-2 VOLTS P to P)
- ELECTRET MICROPHONE INPUT
- 400 MW @ 6 VOLTS, 200 MW @ 4.5 VOLTS
- EASY ASSEMBLY
- TRUE FM (VARACTOR MODULATION)
- INCLUDES TRANSMITTER, CRYSTAL, BATTERYHOLDER, MICROPHONE, ANTENNA, & INSTRUCTIONS

ONLY $99.95

LET THE MICRO 2B KEY UP THE VFC400 AND DO THE TALKING



MICRO 2B VOICE RECORDER

-20/60 SECONDS REC/PLAY
-KEY OUT
-5-13.8 DC VOLT SUPPLY
-AUTO TIMER (.1 SEC-10 MIN.)
-AUDIO OUT, SPEAKER OR LINE

-THE MICRO 2B IS THE PERFECT COMPANION TO THE VCF400 FOX HUNT TRANSMITTER
-NATURAL SOUND VOICE PLAYBACK

-THE MICRO 2B WILL KEY THE VCF400 FOX HUNT TRANSMITTER VIA THE KEY OUT FEATURE AND SAY (YOU CAN'T FIND ME) OR WHATEVER YOU LIKE

AGRELO ENGINEERING
1145 CATALYN STREET
SCHENECTADY, NY 12303

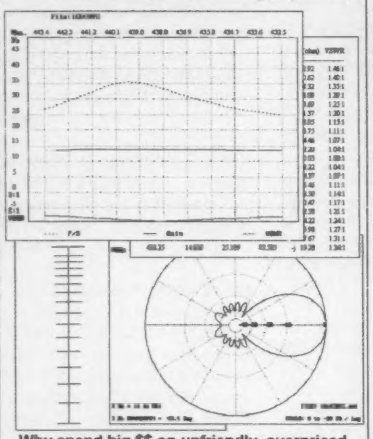
ORDER BY PHONE OR MAIL IN U.S.A. ADD $5 FOR S&H. C.O.D. CHARGES APPLY NYS RESIDENTS ADD SALES TAX

TECH. FAX: 518-381-1058 TO ORDER: CALL 1-(800)-588 4300 TECH. SUPPORT: 518-381-1057

CIRCLE 281 ON READER SERVICE CARD

"DESIGNING A YAGI HAS NEVER BEEN SO EASY!"

. . . 73 Amateur Radio Today, April '94



Why spend big $$ on unfriendly, overpriced and very slow optimize-only software ???

Quickyagi, the high speed, low cost, easy-to-use software features auto design & optimize plus performance analysis. With amazing accuracy, it will accommodate 17 elements, Freq. to 1 Ghz., mntg/boom and tapered element modeling, folded dipole, scaler, and prints all files, polar plots and graphs. Both co-proc. & no co-proc. versions are included.

For PC-AT w / 640 K RAM, VGA, EGA, CGA, Herc and DOS 3.0 or higher

Quickyagi™ v3.1 $39.95* + S&H
By WA7RAI

Add $3.00 s&h or $5.00 for non-USA orders • Incl. Callsign w/order
Send SASE for complete info. • US Check or Internat'l Money order
Arizona orders add 5.5% state tax • Specify 3.5" or 5.25" floppy disk

RAI Enterprises (602) 435-9523
5638 W. Alice Av. Glendale, AZ 85302

Say You Saw It In
73 Amateur Radio Today

Why buy a TNC?
PC HF FAX + PC SWL $179.00

SPECIAL COMBINATION OFFER

For a limited time, if you order PC HF FAX $99 (see our other ad in this issue), you can add our new and improved PC SWL 3.0 for $80.00 instead of our regular low price of $99.00.

PC SWL contains the hardware, software, instructions and frequency lists needed to allow you to receive a vast variety of digital broadcasts transmitted over shortwave radio. All you need is any IBM PC or compatible computer and an SSB shortwave receiver. The product consists of:

Demodulator
Digital Signal Processing Software
200 Page Tutorial Reference Manual
World wide Utility Frequency List
Tutorial Audio Cassette with Samples

PC SWL automatically decodes Morse code, RTTY, AMTOR, SITOR, NAVTEX and ASCII.

PC SWL lets you tune in on world press services meteorological broadcasts, ham radio operators, coastal shore stations, aviation telex and much more digital action on the shortwave bands. Why pay for another expensive box when a simple interface and your PC can do the job?

ADVANCED FEATURES:

Tuning Oscilloscope
Digital Waveform Presentations
Auto Calibration and Code Recognition
Continuously Tunable Filter Frequencies
Variable Shift
Adjustable CW Filter Sensitivity
Unattended Capture and Printing
Integrated Text Editor
Integrated Log and Database
Shell to DOS applications
Seamless Integration with PC HF Facsimile

Call or write for our complete catalog of products.
Visa & MasterCard welcome.

Software Systems Consulting
615 S. El Camino Real, San Clemente, CA 92672
Tel:(714)498-5784 Fax:(714)498-0568

CIRCLE 244 ON READER SERVICE CARD

47 FOOT ANTENNA WORKS ALL BANDS. Only $40.00 ppd in 48 states. Fully assembled, not a kit. Superb results! Satisfaction guaranteed 100%. SASE for catalog and information sheet. **THE ANT FARM,** P.O. Box 3196, Wescosville PA 18106. BNB409

MAHLON LOOMIS, INVENTOR OF RADIO; (patented 1872) by Thomas Appleby. (Copyright 1967). Available from **JOHAN K.V. SVANHOLM, N3RF, SVANHOLM RESEARCH LABORATORIES,** P.O. Box 81, Washington DC 20044. Please send $25.00 donation with $5.00 for S&H. BNB420

BROWNIES QSL CARDS SINCE 1939. Catalog & samples $1 (refundable with order). 3035 Lehigh Street, Allentown PA 18103. BNB430

FREE...Ham Radio **Gospel Tracts:** DX Contact and Christian Helps, SASE: N1GDP, RAR-OFC, P.O. Box 8, Harmony ME 04942. BNB443

COMPUTER PRINTER RIBBONS BY MAIL High quality, low cost. Black or color. Tell us your needs. Free quote. **HARCLY(A),** P.O. Box 830, Coquille, OR 97423. BNB457

WHY RISK FAILURES With Aerial Supports? Dacron rope, high UV resistant, non-stretch Military Type black DOUBLE (unlike our competitors' single) braided. 1-800-328-4773. BNB557

MODIFICATION REPORTS HR2510, RCI 2950, Ranger 3300/3500—frequency, RF power modulation, RIT, etc., $10 ea. or $25 for all three. Four-hour video on VCR. Repair $19.95. Send to **JACK FISHER,** POB 612, Oceano CA 93445. BNB620

DUPLEXER TUNING GUIDE. A complete booklet showing step-by-step instructions on tuning all types of duplexers. Included is theory of operation, detailed diagrams and much more. Send $9.95 plus $2.50 s&h to **RGM PUBLICATIONS,** 533 Main Street, Hillsboro NM 88042. For faster service using a major credit card call (505)895-5333 and order today. 30 day money back guarantee. BNB635

SATELLITE EQUIPMENT Best $$$ USA. (800)851-6534. BNB640

FOR SALE Icom IC-2SAT, IC-W2A, PK-88 Laptop computer, personal autopatch, Epson Printer. Anthony Nota, (201)284-1105. BNB675

HAM RADIO REPAIR- All makes and models. Fast, Professional Service. **AFFORDABLE ELECTRONIC REPAIR,** 7110 E. Thomas Rd., Scottsdale AZ 85251. (602)945-3908. BNB700

ROSS' $$$$ USED JANUARY SPECIALS: Kenwood TS-940SAT, $1400.90; TS-530S/W YK-88C, $599.90; TV-506, $250.00; VFO-820, $150.00; ICOM IC-701, $380.00; R-71A, $698.90; IC-R1, $490.00; IC-701PS, $109.90; Yaesu FRG-8800/W FRV-8800, $580.90; FT-747GX, $599.90; FT-690RII, $600.00; Advanced Radio Devices 230A, $3,499.90; Heathkit WH-5400, $369.00; SB-630, $115.00; SBA-1400, $150.00; IG-5257, $120.00; SB-630, $129.90; Hallicrafters HT-37, $399.90; HT-41, $595.90; LOOKING FOR SOMETHING NOT LISTED? CALL OR SEND 2 STAMPS. We have over 120 used items in stock.

Mention ad. Prices cash, F.O.B. Preston. HOURS: TUESDAY-FRIDAY 9:00 TO 6:00, 9:00-2:00 P.M. MONDAYS. CLOSED SATURDAY & SUNDAY. **ROSS DISTRIBUTING COMPANY,** 78 SOUTH STATE, PRESTON ID 83263. (208)852-0830. BNB707

ELECTRON TUBES: All types and sizes. Transmitting, receiving, microwave . . . Large inventory = same day shipping. **DAILY ELECTRONICS,** 10914 NE 39th ST. Suite B-6, Vancouver, WA 98682. (800)346-6667 or (360)896-8856. BNB719

MINIATURE POLICE RADAR TRANSMITTER One mile range, $41 assembled, $31.00 kit. 9025 Coldwater Rd. Bldg. 100A, Fort Wayne IN 46825. BNB725

HAM RADIO REPAIR—Prompt service. **ROBERT HALL ELECTRONICS,** 1660 McKee Rd., Suite A, San Jose CA 95116. (408)729-8200. BNB751

GET YOUR "FCC COMMERCIAL GENERAL RADIOTELEPHONE LICENSE". Electronics Home Study. Fast, inexpensive! "Free" details. **COMMAND PRODUCTIONS,** D-174, Box 2824, San Francisco CA 94126-2824. BNB761

WANTED: HAM EQUIPMENT AND RELATED ITEMS. Donate your excess gear, new-old-in any-condition to the Radio Club of Junior High School 22, the nation's only full-time, nonprofit organization working to get ham radio into schools around the country as a teaching tool using our EDUCOM—Education Thru Communication—program. Send your radio to school. Your donated material will be picked up ANYWHERE or shipping arranged, and this means a tax deduction to the full extent of the law for you as we are an IRS 501(c)(3) charity in our 15th year of service. It is always easier to donate and usually more financially rewarding, plus your gift wil mean a whole new world of educational opportunity for children nationwide. Radios you can write off, kids you can't. Start 1995 by helping a child and yourself. Write, phone or FAX the WB2JKJ "22 Crew" today: The RC of JHS 22, P.O. Box 1052, New York NY 10002. Telephone (516) 674-4072 or FAX (516) 674-9600. Meet us on the WB2JKJ CLASSROOM NET, 7.238 MHz 1200-1330 UTC daily and 21.395 MHz from 1400 to 2000 UTC. BNB762

PACKET RADIO Join TAPR, connect with the largest packet/digital group in the US. Creators of the TNC-2 standard. Benefits: newsletter, software, discount on kits/publications. $15/year US, $18 Can/Mex, $25 elsewhere Visa/MC. When joining, mention *73*, receive TAPR's Packet Radio Info booklet ($7 value) FREE! (817)383-0000. Mail:8987-309 E. Tanque Verde Rd. #337, Tucson AZ 85749-9399. BNB765

SERIOUS ABOUT SOLAR POWER? The PVSP starter kit comes with a 32 watt Solarex VLX panel and a ten amp Sunlogic charge controller. Special introductory price $275 plus $7 shipping. **SUNLIGHT ENERGY SYSTEMS,** 2225 Mayflower NW, Massillon OH 44647. BNB774

R-390A—SALES—SERVICE—PARTS. Info SASE: **MILTRONIX,** P.O. Box 3541, Toledo OH 43608. BNB813

OVER A MILLION CALL SIGNS
"ONLINE" U.S. INTERNATIONAL CALL DIRECTORY
Hamcall online service gives you access to over a million hams via your computer & modem. Updated each month! *Only* $29.95 per year. Unlimited use - 24 hours a day - you pay for the phone call.
800:282-5628 703:894-5777 FAX 703:894-9141
BUCKMASTER
Route 4, Box 1630 - Mineral, Virginia 23117
Internet: info@buck.com
CIRCLE 7 ON READER SERVICE CARD

No-Hands! RescuePouch™
When your hands are busy, where do you want your HT? Ask firefighters, police, construction workers, forest rangers, ski patrols, SWAT teams, and paramedics. They designed our chest mounted RescuePouch so they could listen without an earpiece and talk straight into it no-hands. Diagonal positioning of HT places antenna over the shoulder not in your face. Made of padded rot-proof Cordura with quick-release buckles. Adjusts to grab any size HT. Unique Double model holds two HTs or HT and spare battery.
Single $31. Double $41. Add $3 P&H
AntennasWest
Box 50062-F Provo UT 84605
Order Hotline: 801-373-8425
CIRCLE 275 ON READER SERVICE CARD

Use Your Reader Service Card Today! Our Advertisers Want To Hear From You!

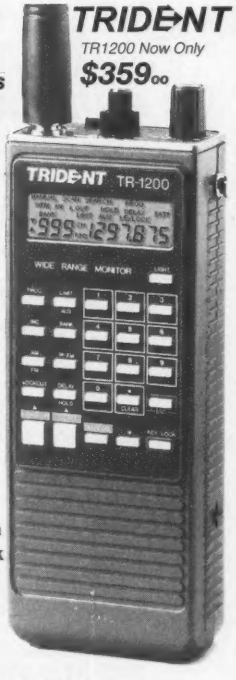
ATV CONVERTERS • HF LINEAR AMPLIFIERS

DISCOVER THE WORLD OF FAST SCAN TELEVISION
70 CM
33 CM
AMATEUR TELEVISION CONVERTERS
ATV3 420-450 (GaAS-FET) ..... $ 49.95 Kit
ATV4 902-928 (GaAS-FET) ..... $ 59.95 Kit
2 METER VHF AMPLIFIERS
35 Watt Model 335A ..... $ 79.95 Kit
75 Watt Model 875A ..... $119.95 Kit
Available in kit or wired/tested

HF AMPLIFIERS per MOTOROLA BULLETINS
Parts List for HF Amplifiers (2-30MHz) Described in the MOTOROLA Bulletins
AN758 300W AR313 300W
AN762 140W AR305 300W
AN779L 20W EB63 14CW
AN779H 20W EB27A 300W
EB104 600W
New!! 1K WATT 2-50 MHz Amplifier
POWER SPLITTERS and COMBINERS 2.39MHz
600 Watt PEP 2-Port ..... $ 69.95
1000 Watt PEP 2-Port ..... $ 79.95
1200 Watt PEP 4-Port ..... $ 89.95
100 WATT 420-450 MHz PUSH-PULL LINEAR AMPLIFIER - SSB - FM ATV
KEB67-PK (Kit) $159.95
KEB67-PCB (PC Board) ..... $ 18.00
KEB67-I (Manual) ..... $ 5.00

UNIVERSAL DIGITAL FREQUENCY READOUT
TK-1 (Wired/tested) $149.95
HEAT SINK MATERIAL
Model 99 Heat Sink (6.5 x 12 x 1.6) ..... $ 24.00
CHS-8 Copper Spreader (8 x 6 x 3/8) ... $ 22.00
We stock Hard-to-Find parts
CHIP CAPS-Kemet/ATC
METALCLAD MICA CAPS-Unelco/Semco
RF POWER TRANSISTORS
ARCO TRIMMER CAPACITORS
BROADBAND HF TRANSFORMERS
MINI-CIRCUIT MIXERS
SBL-1 (1-500Mz) ..... $ 6.50
SBL-1X (10-1000Mz) ..... $ 7.95
NEW Low Pass Filters for Harmonics (Up to 300W) 10m, 15m, 20m, 40m, 80m & 160m

For detailed information and prices, call or write for our free catalog.
VISA
Add $4.00 for shipping & handling
CCI Communication Concepts Inc.
508 Millstone Drive • Beavercreek, Ohio 45434-5840
(513) 426-8600 • FAX (513) 429-3811
CIRCLE 99 ON READER SERVICE CARD

500KHz to 1.30GHz, 1000 Channels AM/FM/WFM
TRIDENT TR1200 Now Only $359.00


Total coverage at a very economical price. VFO, Search lockout and Full function LDC display. Steps down to 5KHz.EEPROM memory. BNC antenna connector. Size: 5 7/8"H x 1 1/2"D x 2"W. Wt: 14oz. Includes AA Batteries. Cell blocked for use in USA. Call or fax Toll free in USA and Canada. 24 hours a day, 7 days a week.
ACE COMMUNICATIONS
1 800 445 7717
10707 E. 106th, Fishers, IN 46038
International: 317 842 7115 Fax 317 849 8794
CIRCLE 164 ON READER SERVICE CARD

Pocket Morse Code Trainer
Learn Code Faster & Easier
Better than code tapes
Take it anywhere to practice
Ideal for beginners to advance

Features: Only $29.00
* Code rates from 3 to 31 wpm
* Plays standard or Farnsworth.
* Dimensions 1" x 3.8" x 2.4"
* Runs 40 hr on one 9v battery
3 Modes of Operation
1. Continious fresh random code.
(selectable letter groups, ie A-Z, 0-9, and more)
2. Random code practice test.
(Check your accuracy against the answer key)
3. Interactive training mode

Deluxe Pocket Morse Code Trainer
6 Modes of Operation $49.00
The deluxe unit has 3 additional modes
4. Continious newly generated QSO.
(New QSO are generated everytime)
5. Practice code exams just like the real code test. (incl. answer key to check accuracy)
6. Continious random words
Computer Aided Technology Visa&MC, Add $5 S&H
10132 Monroe Dr., Dallas, Tx 75229 PH 214-350-0888
CIRCLE 276 ON READER SERVICE CARD

Rugged G5RV QuickKits™

created by Antennas West — Box 50062-S, Provo, UT 84605

Fast & Easy to Build
- Fail-Safe visual instructions
- No measuring or cutting
- Everything included
- Finish antenna in minutes

Quality Components
- Presoldered Silver Fittings
- Kinkproof QuietFlex wire
- Fully insulated, wx sealed, no-corrode, low noise design

Tunes All Bands Incl WARC

• Double Size G5RV 204 ft 160-10 Dipole	$59.95
• Full Size G5RV 102 ft 80-10 Dipole	$39.95
• Half Size G5RV 51 ft 40-10 Dipole	$29.95
• Quarter Size G5RV 26 ft 20-10 Dipole	$24.95
• ReadyMade 102 ft G5RV	$50.00
• ReadyMade 51 ft G5RV/2	$40.00
• 200' Dacron 250# line	$11.95

Want Plans, Patterns, Data? Order TechNote #124-D $6.95 ppd USA

Order Hot-Line: 1-800-926-7373 — Add $5 P&H

CIRCLE 116 ON READER SERVICE CARD

Say You Saw It In
73 Amateur Radio Today

WANT TO LEARN CODE?

Morse Tutor *Gold* is the answer for the quickest and easiest way for beginners and experts alike.

From the moment you start the easy and speedy self loading procedure to the day you reach your goal, **Morse Tutor *Gold*** will gently coach you through the learning process.

Since 1987, GGTE has guided nearly 20,000 hams and prospective hams around the world through proven structured lessons and a variety of character, word and conversation drills. Straight forward menus make the process simple and fun.

You select the characters and **Morse Tutor *Gold*** will prepare a random character drill with those characters. **Morse Tutor *Gold*** makes it easy to create your own drills or import text files. You can now type what you hear or copy by hand and see, one line at a time, what the computer sent or what you typed. Pick the Farnsworth or the standard method; select the tone frequency most comfortable for you or select your code speed in tenths of a word per minute.

You are always in command.

Sound Blaster

Morse Tutor *Gold* uses your internal speaker or sound board (certified by Creative Labs for all Sound Blaster products). And, if you use a sound board the program supports volume control.

Get the software the ARRL sells and uses to create practice and test tapes. Morse Tutor *Gold* is approved for VE exams at all levels.

Attention Morse Tutor and Morse Tutor Advanced Edition registered users. Make sure we have your current address. Special upgrade offers will be mailed shortly. Don't miss out

Bought it on Friday-passed my 5 words on Sunday A. Peters "Great program-does all it was said to-it was loaded and in use within 15 minutes of it's arrival. Truly user friendly." KD6MYL "Better than my wildest expectations! Sorry I didn't have it years ago. It's much better than any code tapes." KB6NR "By far the best Morse Code program I have ever seen! I'm an ARRL VE. KF6SY "This is a crackerjack way for this newcomer to learn the Morse Code. Well worth the price." W.B. Marks

For all DOS computers. Available thru dealers, 73 Magazine, QST, or send $29.95 + $3 S&H (CA residents add 7.75% tax) to: GGTE, P.O. Box 3405, Dept. MS, Newport Beach, CA 92659
Specify 5¼ or 3½ inch disk

Morse Tutor *Gold* is a trademark of GGTE.
Sound Blaster, the Sound Blaster Logo and the Sound Blaster Compatibility Logo are trademarks of Creative Technology Ltd.

CIRCLE 193 ON READER SERVICE CARD

FOR HAMS ONLY — Robb KE3EE, Jerry K3FKI, Dave KA3ZNY

4309 Northern Pike Blvd. Monroeville, PA 15146
(412)374-9744
FOR ORDERS ONLY CALL (800)854-0815
Specializing in Preowned Amateur and Shortwave Equipment
Buy • Sell • Repair • Love To Trade
We Carry All Major Brands of New Equipment
We Now Custom Design & Build Computers
For HAMs by HAMs
All of The Latest Hardware & Software
Call For Details

CIRCLE 329 ON READER SERVICE CARD

RF Shielded Steel Boxes

- Lids can be soldered
- Hot tin-plated steel boxes with individual dividers
- Eliminate spillover of unwanted signals
- Feed thru capacitors also available

MODEL	L x W x H (IN.)	$
SB-1	2.1 x 1.9 x 1.0	4.50
SB-2	3.3 x 1.9 x 1.0	6.00
SB-3	4.2 x 1.9 x 1.0	8.00
SB-4	6.3 x 1.9 x 1.0	10.50
SB-5	3.3 x 2.7 x 1.1	9.50
SB-6	4.8 x 2.7 x 1.1	11.50
SB-7	6.4 x 2.7 x 1.1	13.20
SB-8	2.6 x 2.7 x .83	7.00
SB-9	3.2 x 2.7 x .83	8.25
SB-10	4.8 x 2.7 x .83	9.00
SB-11	6.3 x 2.7 x .83	10.75
FTS-1	1000pF/50VDC solder type	.85
FTS-1-1	1000pF/50VDC screw-in type	3.50

FREE EXPANDED 1995 CONSTRUCTOR'S CATALOG

PREPAID ORDERS SHIP GROUND *FREE*
(48 STATES, CANADA & MEXICO)
SESCOM, INC.
2100 WARD DR., HENDERSON, NV 89015 USA
USA/CANADA (800) 634-3457
FAX (800) 551-2749
(702) 565-3400 FAX (702) 565-4828
TECH LINE (702) 565-3993 M-Th 8 am to 4 pm (PST)

VISA

CIRCLE 167 ON READER SERVICE CARD

Sell your product in
73 Amateur Radio Today
Call Dan Harper today . . .
1-800-274-7373

DOWN EAST MICROWAVE
IS MOVING!!

We will continue to be your number one source for 50 MHz to 10 GHz equipment.

Transverters & Down Converters;
Linear Amps; Low Noise Preamps;
Antennas & Accessories; Cable; Connectors;
Antenna Relays; Components

Write or Call for Catalog.

For All Equipment & Antennas:
DOWN EAST MICROWAVE, INC.
Steve Kostro, N2CEI
954, CR 519
Frenchtown, NJ 08825
(908) 996-3584

For Antennas & Accessories:
DIRECTIVE SYSTEMS
Dave Olean, K1WHS
RR1, Box 282
Lebanon, ME 04027
(207) 658-7758
Thanks, and Catch You on the Bands!
73, Bill W3HQT

FREE IBM SHAREWARE AND HAM CATALOG. Morse Code Computer Interfaces, $49.95. **DYNAMIC ELECTRONICS,** Box 896, Hartselle AL 35640. (205)773-2758, FAX (205)773-7295. BNB815

MORSE CODE MUSIC!— Do Aerobics, Sing, or Jog, while learning code! Sensational new discovery and now the secret is yours! Order **THE RHYTHM OF THE CODE** cassette today! $9.95 + $2.00 S&H. **KAWA RECORDS** P.O. Box 319-S, Weymouth, MA 02188. The HIT of the Dayton Hamvention! BNB824

THE ANARCHIST'S BBS is a resource for Anarchists, Investigators, Researchers, Computer Hackers and Phone Phreaks. Categories include: Computer Hacking, Investigation Techniques, Telecommunications Technology and Surveillance. Call (214)289-8328 for free trial access. BNB831

FCC COMMERCIAL LICENSE PREPARATION RADIOTELEPHONE-RADIOTELEGRAPH. Latest home study fast easy audio video. Q & A pool disks. FREE details **WPT PUBLICATIONS** (800)800-7588. BNB840

EARTHQUAKE Forces sale of Lifetime Collection. Make offer! Johnson Viking Invader 2000; Viking 500; Collins 75A-2; R-388/URR; R-391/URR; RME; CEI; other Ham, CB, Military transmitters, receivers, parts, etc. For information send large SASE: Steve Phillips, P.O. Box 4916, Chatsworth CA 91313, (818)998-5654; (818)704-6306. BNB850

ELECTRONICS GRAB BAG! 500 pieces of new components: inductors, capacitors, diodes, resistors. $5.00 postpaid. **ALLTRONICS,** 2300 Zanker Rd., San Jose CA 95131. BNB855

HEATHKIT WANTED! S.B. Series **"Green Front"** for parts. Robert Schlegel, 2302 286th St. East, Roy WA 98580. BNB910

WANTED: BUY AND SELL All types of Electron Tubes. Call (612)429-9397, Fax (612)429-0292. **C & N ELECTRONICS,** Harold Bramstedt, 6104 Egg Lake Road, Hugo MN 55038. BNB915

LOW COST HAM EQUIPMENT. Send stamp for list. **WA4DSO,** 3037 Audrey Dr., Gastonia NC 28054. BNB927

RADIO REPAIR Amateur and commercial, professional work. Fred Fisher WF9Q, 6866 W. River Rd., South Whitley IN 46787. (219)723-4435. BNB930

RF TRANSISTORS, Japanese transistors and tubes need dealers, repair shops, kit makers, etc. for 2SC1969, 2SC2312, MB8719, MRF455, MRF454, 2SC2879 and more. **WESTGATE** (800)213-4563. BNB950

FREE HAM GOSPEL TRACTS. SASE. **N3FTT,** 5133 Gramercy, Clifton Heights PA 19018. BNB960

PRINTED CIRCUIT BOARDS for projects in *73, Ham Radio, QST,* ARRL Handbook. List SASE. **FAR CIRCUITS,** 18N640 Field Ct., Dundee IL 60118. BNB966

PORTABLE 2 METER BEAM Easy assembly, ruggedly made, all parts store in boom, 7.5 dBd

gain, $50.00 US + shipping. SASE for info. **AURORA ANTENNAS** Box 477, Penticton BC Cnanda V2A 6K6, (604) 492-5084. BNB975

AZDEN SERVICE by former factory technician. **SOUTHERN TECHNOLOGIES AMATEUR RADIO, INC.**, 10715 SW 190 St. #9, Miami FL 33157. (305)238-3327. BNB979

1995 ANTIQUE RADIO calendar; 1995 Classic Amateur Radio calendar, $9.95 each. **ACCESSORIES UNLIMITED,** 160 N. Church, Mt. Pleasant PA 15666. BNB990

ROTOR PARTS ROTOR SERVICE, ROTOR accessories: Brak-D-Lays, Quik-Connects, Pre-Set mods. NEW models for sale. Free catalog. **C.A.T.S.,** 7368 State Road 105, Pemberville OH 43450. BNB996

NEW! The Handy HamBook by K2EWA. 200 pages, 5-1/2" x 8-1/2". Technical data and practical info including formulas, tables, nomographs, charts, operating aids and much more. Only $12.00 + $2.50 S/H. NJ residents add 6% tax. **Romanco,** POB 34, Milltown, NJ 08850-0034. BNB997

Wanted: Squires-Sanders receiver, SS-1V bandscan. **Weber,** 4845 West 107th Street, Oak Lawn IL 60453-5252. BNB998

Home Automation Become a dealer in this fast-growing field. Free information, (800) 838-4051. BNB1000

Enmergency Communications T-Shirts in large letters on back with Federally Licensed Radio Operator insignia on front. 100% cotton in Large, XL, XXL. **$18.00** 1-800-435-3528. BNB1002

Avcom PSA-65A Spectrum Analyzer Battery-powered portable 2-1000 MHz w/ 10 kHz resolution filter and carrying case. Purchased for $3,400 less than two years ago. Used briefly to set up one cable TV installation. Best offer over $2,000 or trades for 486 PC. **Ira,** (212) 749-7170 after 6 p.m. BNB1003

SELLING: Motorola T1930 10 meter transmitter chassis; P350 RF unit; P353 modulator; P351, P352 power supplies. **Joe,** (708) 966-4835. **SELLING:** Motorola 900 MHz, AM single-channel commercial transceiver, best offer. **Klaus,** (708) 966-4835. **WANTED:** Working ICOM IC-3A or IC-3AT. **Klaus WB9YBM** (708)966-4835. BNB1004

Budget QSL Cards $1 for samples (refundable with order) B.B.B.S., 170 North Wilson Road #132, Columbus OH 43228-1263. BNB1005

Native Ukrainian wants to be your Tech Rep in Ukraine or Eastern Europe. Fluent in four languages, BSE degree, highly skilled in IBM/DOS hardware/software networking, LF to UHF communications, antenna and transceiver design. Training or temporary work in the USA to learn your products OK. **KC1VF/US5WE,** (703) 231-6478, P.O. Box 2490, Christainsburg VA 24068. BNB1006

WANTED: Crystal radios, Galena or germanium diode. Factory-built or quality home-brew, pre-1960. (503) 231-9708, or P.O. Box 42351, Porthead OR 97242. BNB1007

2 Meter Portable
Arrow (shaft) Antenna
This is the one you have heard about. Changes from a walking stick to a 4 element beam in less the 2 minutes.
Strong & Light Weight
Simply the Best
$73.00 Includes Shipping
Arrow Antenna
1461 Peacock Pl.
Loveland, CO 80537
(303) 663-5485
Fax (303) 663-5065
CIRCLE 80 ON READER SERVICE CARD

TigerTail™
Range Extender for 2 meter Handhelds
• Easy to Use
• Unobtrusive
• Easily Concealed
• Snaps on Handheld
• Weighs only 1/3 oz.
• Adds No Bulk or Height
• Boosts Signal from Flex & 1/4 wave Antennas
• Lowers Radiation Angle
• Improves both Receive and Transmit
• Raises Low Power Performance
• Saves your Battery Pack
Order Hotline 1-800-926-7373
AntennasWest
Box 50063-B, Provo, UT 84605
See and Hear the Difference
7 95
CIRCLE 107 ON READER SERVICE CARD

INDIANA HAMFEST
& Computer Show
Sunday, March 12, 1995
Indiana State Fairgrounds
Indianapolis, Indiana
Open at 8:00 A.M.
* All Indoors * Paved Parking Lots * Forums * Over 500 Tables
* Many Nationally Advertised Commercial Dealers * Flea Market
Talk-in on the N9AJS Repeater 147.060 MHz
Come & enjoy a show by our "Quality" dealers!
For Tables: SASE to: Deanne Martin N9TEJ, 39 Lake Shore Dr. #14, Martinsville, IN 46151, 317-342-4307

Sell your product in ***73 Amateur Radio Today***
Call Dan Harper today. . . **1-800-274-7373**

1691 MHz Weather Satellite System

1691 MHz Hemt Pre-amp. model TS-1691-P. Amp	$250
1961 MHz Receiver model TS-1691-Recvr	$450
Decoder Board & Software model TS-VGA-SAT4	$349
Low Loss Coaxial Cable (65ft) with connectors. other lengths available	$65
Track II Satellite Orbital Program. Tracks ALL satellites, world map, print out	$99
1691 MHz Loop Yagi Antenna model 1691-LY(N)	$99

Demonstration Disc (IBM-PC VGA compatible) of signals recorded from WX-SAT system. $3

Shipping: FOB Concord, Mass.
Prices subject to change without notice.

MasterCard VISA

SPECTRUM INTERNATIONAL, INC.
Post Office Box 1084, Dept. S
Concord, Mass. 01742, U.S.A.
Phone: (508) 263-2145
Fax: (508) 263-7008
CIRCLE 183 ON READER SERVICE CARD

CABLE X-PERTS, INC.

COAX	100FT/UP	500FT
FLEXIBLE 9913 UV RES DIRECT BURIAL JACKET	.62/FT	.59/FT
9913 EQUAL UV RESISTANT JACKT	.47/FT	.43/FT
RG 213/U MIL-SPEC DIRECT BURIAL JACKET	.34/FT	.32/FT
RG 8/U FOAM 95% BRD UV RESISTANT JACKET	.32/FT	.30/FT
RG MINI 8X BLK, CLR or SILVER JKT (UV RES)	.16/FT	.15/FT
RG 58/U SOLID CENTER CONDUCTOR	.15/FT	.13/FT
RG 58A/U STRANDED CENTER CONDUCTOR	.17/FT	.15/FT
RG 142/U DBL SILVER BRD TEFLON	1.30/FT	1.10/FT
RG 214/U DBL SILVER BRD IIA JACKET	1.50/FT	1.30/FT
RF 11/U FOAM PE SOLID CENTER 95% BRD	.42/FT	.40/FT
450 OHM LADDER LINE 19GA SOLID CW COND	.12/FT	.11/FT
LMR 600 LOW LOSS (LIKE 1/2" HARDLINE)	1.47/FT	1.45/FT
LMR 400 LOW LOSS (SIMILAR TO 9913)	.62/FT	.60/FT
ROTOR CABLE		
STANDARD DUTY (8 COND) 2/18 6/22 UV RES	.20/FT	.18/FT
HEAVY DUTY (8 COND) 2/16 6/20 UV RES JKT	.35/FT	.33/FT
EXTRA HVY DUTY (8 COND) 2/14 6/18 UV RES JKT	.48/FT	.46/FT
18GA 4/C GRAY PVC JACKET	.15/FT	.13/FT
18GA 5/C GRAY PVC JACKET	.17/FT	.15/FT
18GA 7/C GRAY PVC JACKET	.19/FT	.17/FT
ANTENNA WIRE		
14 GA 168 STR SUPERFLEX UNINSULATED	.14/FT	.12/FT
14GA 7/22 HARD DRAWN BC UNINSULATED	.08/FT	.07/FT
14GA SOLID "COPPERWELD" UNINSULATED	.07/FT	.06/FT
14GA SOLID BC UNINSULATED	.07/FT	.06/FT
12GA 19/25 BC UNINSULATED	.13/FT	.11/FT
16GA 26/30 BC INSULATED	.07/FT	.06/FT
14GA 41/30 BC INSULATED	.09/FT	.08/FT
12GA 65/30 BC INSULATED	.13/FT	.12/FT
DACRON ROPE DBL BRD 3/16" 770# TEST	.12/FT	.10/FT
BALUNS	**PRICE**	
W2AU 1:1 OR 4:1 1.8-40MHZ TRANSFORMER TYPE	$21.00/EA	
W2DU 1:1 1.8-30MHz CURRT TYPE DIPOLE OR BEAM	$23.00/EA	
ORIGINAL G5RV KIT	$25.00/EA	
LADDER-LOC	$11.95/EA	
D.C. POWER SUPPLIES		
4AMP W/LIGHTER PORT	$29.95/EA	
11AMP W/BANANA PLUG TERMINALS	$61.95/EA	
14AMP W/BANANA PLUG TERMINALS	$71.95/EA	
20AMP W/BANANA PLUG TERMINALS	$98.95/EA	

WIRE			
100GA 2/C RED/BLK	25FT $10.00	50FT $20.00	100FT $38.00
12GA 2/C RED/BLK	25FT $7.50	50FT $15.00	100FT $28.00
1" TINNED COPPER BRAID 10 FT $10.00		25FT $20.00	100FT $75.00
1/2" TINNED COPPER BRD 25FT $12.00		50FT $24.00	100FT $40.00

CONNECTORS		
PL 259 SILVER/TEFLON/GOLD TIP	10PKS $11.00	25PKS $25.00
"N" CONNECTOR SILVER/GOLD TIP	10PKS $32.50	25PKS $75.00

MORE ITEMS STOCKED...
CABLE & WIRE CUT TO YOUR SPECIFIC LENGTH!
ORDERS ONLY: 800-828-3340
TECH INFO: 708-506-1886 FAX: 708-506-1970
113 McHenry Rd., Suite 240
Buffalo Grove, IL 60089-1797
VISA
For Complete Literature Mail SASE

Uncle Wayne's Bookshelf

REFERENCE

TAB2701 Transmitter Hunting *by Joseph Moell and Thomas Curlee* Radio direction finding simplified. **$19.95**

03R02 RTTY Today *by Dave Ingram* Modern guide to amateur radioteletype. **$8.50**

05E03 First Book of Modern Electronics Unique projects that are money saving. **$12.95**

09D22 The World Ham Net Directory *by Mike Witkowski* New—2nd edition. Introduces the special interest ham radio networks and shows you when and where you can tune them in. **$9.50**

WGP87158 1994 North American Callbook The 1994 North American Callbook lists the calls, names, and address information for 500,000+ licensed radio amateurs in all countries of North America. **$29.95**

05H24 Radio Handbook, 23rd Ed. *by William I. Orr W6SAI* 840 pages of everything you wanted to know about radio communication. **$39.95**

WGP1234 1994 International Callbook The new 1994 International Callbook lists 500,000+ licensed radio amateurs in the countries outside North America. it covers South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions). **$29.95**

02B10 Heath Nostalgia *by Terry Perdue K8TP* 124 page illustrated history of the Heath Company. Includes many fond memories contributed by longtime Heathkit employees. **$9.50**

12E76 Basic Electronics *Prepared by the Bureau of Naval Personnel* Covers the important aspects of applied electronics and electronics communications. **$10.95**

12E41 **Second Level Basic Electronics** *Prepared by the Bureau of Naval Personnel* Sequel to Basic Electronics, thorough treatment of the more advanced levels of applied electronics. **$9.95**

01D45 The Illustrated Dictionary of Electronics, 5th Ed *by Rufus P. Turner and Stan Gibilisco* An exhaustive list of abbreviations, and appendices packed with schematic symbols and conversion tables. **$26.95**

20N091 **Most-Often-Needed Radio Diagrams and Servicing Information, 1926-1938, Volume One** *compiled by M.N. Beitman* An invaluable reference for anyone involved in Vintage Radio restoration. **$11.95**

20N096 **How To Read Schematics (4th Ed.)** *by Donald E. Herrington* Written for the beginner in electronics, but it also contains information valuable to the hobbyist and engineering technician. **$14.95**

WLSWOCP Radio Operator's World Atlas *by Walt Stinson, W0CP* This is a compact (5x7), detailed, and comprehensive world atlas designed to be a constant desk top companion for radio operators. **$17.95**

20N020 **Secrets of RF Circuit Design** *by Joseph J. Carr* Written in clear non-technical language, covers everything from antennas to transistors. **$19.50**

DP918 73 Magazine Index 1960-1990 A complete index to every article published in *73 Magazine* through 1990. Book **$15.00 DP919** IBM software (specify type) **$20.00**

DP919 Product Reviews Since 1945 Contains an index to 3,400 product reviews that have appeared in *QST, CQ, HR, 73* and *Radcom*. Book **$12.95** IBM Software 5.25 **$10.00**

BB10036 1994 World Radio TV Handbook 600p. Country-by-county listings of long, medium and shortwave broadcasting stations by frequency, time, and language. Includes world satellite broadcasts, world broadcasts in English, broadcaster addresses, transmitter site maps, and a ton of other valuable listening information. All that for only **$20.** Amazing! **$20.00**

TB17294 Troubleshooting & Repairing Compact Disc Players *by Davidson.* 488 p. Everything and a half you'll need to know to service these confounded things. There's a mint to be made fixing CD players, hi-fi systems and VCRs. **$25.00**

SHORTWAVE

NBPAW94P 1994 Passport to World Band Radio *by International Broadcasting Services, Ltd* You'll get the latest station and time grids. **$17.95**

03S11 **Shortwave Receivers Past and Present** *edited by Fred J. Osterman* Guide to 200+ shortwave receivers manufactured in the last 20 years. The Blue Book of shortwave radio value. **$8.95**

07R25 The RTTY Listener *by Fred Osterman* New and expanded. This specialized book compiles issues 1 through 25 of the *RTTY Listener Newsletter*. Contains up-to-date, hard-to-find information on advanced RTTY and FAX monitoring techniques and frequencies. **$19.95**

UE221 US Military Communications (Part 1) US Military communication channels on shortwave. Covers frequencies, background on point-to-point frequencies for the Philippines, Japan and Korea, Indian and Pacific Oceans, and more. **$12.95**

UE222 US Military Communications (Part2) Covers US Coast Guard, NASA, CAP, FAA, Dept. of Energy, Federal Emergency Management Agency, Disaster Communications, FCC, Dept. of Justice. From 14 KC to 9073 KC. **$12.95**

UE223 US Military Communications (Part 3) Completes the vast overall frequency list of US Military services, from 8993 KC to 27,944 KC. **$12.95**

09S42 **The Scanner Listener's Handbook** *by Edward Soomre N2BFF* Get the most out of your scanner radio. **$14.95**

CRBTIO Tune in on Telephone Calls *by Tom Kneitel K2AES* Formatted as a frequency list with detailed description of each service and its location in RF spectrum. **$12.95**

UE205 **Guide to Radioteletype (RTTY) Stations** *by J. Klingenfuss* Updated book covers all RTTY stations from 3MHz-30MHz. Press, Military, Commercial, Meteo, PTTs, embassies, and more. **$12.95**

CRBASG Air Scan Guide to Aeronautical Communications (5th Ed.) *by Tom Kneitel K2AES* Most comprehensive guide to monitoring US aeronautical communications. Covers all Canadian land airports and seaplane bases, plus listings for Central America, the Caribbean, North Atlantic, and the Pacific Territories. **$14.95**

07A66 **Aeronautical Communications Handbook** *by Robert E. Evans* Exhaustive, scholarly treatment of shortwave aeronautical listening. **$19.95**

CRBTSR The "Top Secret" Registry of US Government Radio Frequencies (7th Ed.) *by Tom Kneitel K2AES* This scanner directory has become the standard reference source for frequency and other important information relating to the communications of federal agencies. **$19.95**

CRBFCF Ferrell's Confidential Frequency List, New Revised Edition *compiled by A.G. Halligey* All frequencies from 4 MHz-28MHz covering ship, embassy, areo, Volmet, Interpol, numbers, Air Force One/Two, more. **$22.95**

15A002 **Scanner and Shortwave Answer Book** *by Bob Grove* Most frequently asked questions by hobbyists. **$13.95**

CRBNDS National Directory of Survival Radio Frequencies *by Tom Kneitel K2AES* Handy and concise reference guide to high interest communications frequencies required by survivalists. **$8.95**

CRBSM1 Scanner Modification Handbook, Vol. 1 *by Bill Creek* provides straightforward step-by-step instructions for expanding the operating capabilities of VHF scanners. **$17.95**

CRBSM2 Scanner Modification Handbook Vol. 2 *by Bill Creek* Here it is—a companion to Vol. I. In fact, Vol. 2 has a section that provides improved approaches and updated techniques for the mods in Vol. 1. There's 18 new exciting modifications for popular scanners. **$17.95**

11EE06 Guide to Embassy Espionage Communications *by Tom Kneitel K2AES* Candid and probing examination of worldwide embassy and (alleged) espionage communications systems and networks. **$10.95**

20N094 A Flick of the Switch, 1930-1950 *by Morgan E. McMahon* Discover the fast-growing hobby of radio collecting. **$8.95**

07R26 World Wide Aeronautical Communications *by Robert E. Evans* Aircraft/Air Traffic Control, Aircraft/Company Operations, Aviation Weather Broadcasts, Aeronautical Flight Tests, Worldwide Military Air Forces, Aero Search & Rescue, Aero Law Enforcement, NASA Flight Support, Aero Terms & Abbreviations and Aero Tactical Identifiers. **$6.95**

UE201 World Press Services Frequencies (RTTY) New 5th Ed A comprehensive manual covering radioteletype news monitoring—contains all information—antenna, receiving, terminal units, plus three extensive frequency lists. **$8.95**

NEW BOOKS

AR3177 The ARRL Spread Spectrum Source Book. From a deceptively simple beginning, a group of experimenters set out to develop first theoretical and later practical systems for spread spectrum communications. This book consists of articles, papers and government reports that document the process whereby amateur spread spectrum progressed from the drawing board to the airwaves. $20.00

TAB11077-8 Encyclopedia of Electronic Circuits (Volume 5) by Graf & Sheets. 753 pages. Anyone who likes to build stuff will go bananas over this treasure trove of circuits. Tons of 'em, for every imaginable application. Most of these circuits have been gleaned from recent radio and electronics magazines. Heck, I counted over 50 taken from *73* articles, and four from *QST*. Just the index to the five volumes of circuits runs 55 pages of small type, with three columns to the page! This has got to be one of the biggest bargains yet for builders, developers, and experimenters. It's a huge book and weighs a ton. $35.00

AR4025 Beyond Line of Sight. This book shows why, as we know today, VHF radio waves can travel thousands of miles. Shows how hams discovered or pushed forward the discovery of the propagation modes that make VHF DX possible: tropo, sporadic-E, aurora and auroral-E, meteor scatter, F-Layer propagation, transequatorial propagation and earth-moonearth. $12.00

TAB11065-1 Mastering Radio Frequency Circuits by Joe Carr, 411 p. If you're interested in learning about radio components and circuits, this book is great! Plus there are a ton of simple circuits you can build. It explains how circuits work, about test equipment, receivers, the works. This will take a lot of the mystery out of how radios work...the easy way. This will be one of your better $20 ham investments. $20.00

XTAL-1 The Crystal Set Handbook by Phil Anderson WØXL Want to give a kid an exciting present? Or maybe yourself? Crystal sets are alive and fun. Here's a whole book packed with crystal set circuits that anyone can build. You may get interested enough to join the Crystal Set Society and get their newsletter. Now start saving those oatmeal boxes, okay? 133 pages $10.95

UTC7201-7 Technical Book Buyer's Guide, 2nd edition, Lopez & Cloney. United Techbook, 355p. If you are into reading, you're going to enjoy this book catalog. It tells you what's in a ton of intersting books. Technical books. All kinds of technologies. Wanna know about chaos, ditigal signal processing, electric cars, computers? $20

WAYNE'S PICKS

SS8756 Warning! The Electricity Around You May Be Hazardous To Your Health *by Ellen Sugarman* An invaluable guide to the risks of electromagnetic fields, and steps you can take to protect yourself and your family. **$11.00**

IB8657 Dumbing Us Down: The Hidden Curriculum Of Compulsory Schooling. *by John Gatto* If you enjoyed "Declare War", you'll enjoy this also. A Wayne Green recommended reading. **$9.95.**

WG2 The Million Dollar Video Uncle Wayne has made a video which explains how just about any company can increase sales by over a million dollars just through the sneaky (aka intelligent) use of promotion. As a magazine editor and publisher he explains in detail how you can manipulate these people to give you tons of free advertising. After all, when one new product release in a magazine can bring in sales equivalent to a full page paid ad, you need to know how to take advantage of this gold mine. $39.95 for a video of Uncle Wayne showing you how to beat the system. Order $1 million Video.

SOFTWARE

04M54 GGTE Morse Tutor From beginner to Extra class in easy self-paced lessons. Code speeds from 1 to over 100 words per minute. Standard or Farnsworth mode. Adjustable tone frequency. Create your own drills, practice or actual exams. Exams conform to FCC requirements. 5 1/4" floppy for IBM PC, XT, AT, PS/2 or compatibles. GG3 1/2+, GG525 **$19.50**

GGADV35+, GGADV5 Advanced Edition $29.95

20N021 **No Code Ham Radio Education Package** Computer software package. Includes computer aided instruction software (IBM compatible), 200 page Ham Radio Handbook. **$29.95**

20N022 **Ham Operator Education Package** Computer software contains five IBM compatible discs with all questions for all license classes, plus "Morse Academy" code teaching software that takes you from 0-20 wpm. **$28.95**

Lanze Code Programs—(Available on 5 1/4" * disk.) Inexpensive complete study guide code programs for both the C64/128 Commodores and the IBM compatibles. Programs include updated FCC questions, multiple choice answers, formulas, schematic symbols, diagrams, and simulated (VE) sample test.

	IBM Part#	Commodore Part#	Price
Novice	LZIBM01	LZCOM01	$14.95
Tech	LZIBM02	LZCOM02	$14.95
General	LZIBM03	LZCOM03	$14.95
Advance	LZIBM04	LZCOM04	$19.95
Extra (New Pool)	LZIBM05	LZCOM05	$19.95

* Add $2.00 for 3 1/2" Disk

LZIBM06, LZCOM06 IBM/Commodore Tech No Code—Lanze Code Program Contains all the authorized FCC questions and answers used in testing formulas, schematic symbols, diagrams, and sample test for passing the new Technician No Code license. **$24.95**

IBM97 Amateur Radio Part 97 Rules New Edition, complete FCC rules. **$9.00**

VIS Study Cards Compact, up-to-date Flash Cards with Key Words, Underlined, Quiz on back. Formulas worked out. Schematics at your fingertips. Used SUCCESSFULLY by ages 6 to 81!

NOVICE	VIS01	$11.95
TECH	VIS02	10.95
GENERAL	VIS03	9.95
ADVANCED	VIS04	15.95
EXTRA	VIS05	14.45

ARRL BOOKS

AR1995 **ARRL 1995 Handbook (71st Ed.)** Features: added DSP, improved treatment of Pi and Pi-L, all new all-digital-logic, plus lots more. **$30.00**

AR1086-4 **ARRL Operating Manual (4th Ed.)** Information on how to make the best use of your station, including: interfacing home computers, OSCAR, VHF-UHF. **$18.00**

AR3657 **QRP Notebook** *by Dave DeMaw W1FB* Presents construction projects for the QRP operator. **$10.00**

AR3207 **W1FB's Design Notebook** *by Dave DeMaw W1FB* Filled with simple practical projects that can be built using readily available components and common hand tools. **$10.00**

AR0402 **Solid State Design** Good, basic information, circuit designs and applications; descriptions of receivers, transmitters, power supplies, and test equipment. **$12.00**

AR4173 **Now You're Talking! All You Need To Get Your First Ham Radio License (2nd Edition)** A complete study guide for the Technician and Novice written exam. Practical information every beginner needs is written clearly and simply and in small doses. **$19.00**

AR4218 **ARRL Repeater Directory 1993-1994** 19,000+ listings with digipeaters, bandplans, CTCSS (PL(TM)) tone chart, frequency coordinators, ARRL special service clubs, and beacon listings from 14 MHz to 24 GHz. **$6.00**

AR3398 **The DXCC Companion** *by Jim Kearman KR1S* Spells out in simple, straightforward terms what you need to be a successful DXer. **$8.00**

AR1250 **Log Book**—Spiral **$3.50**

AR2197 **ARRL Data Book** Valuable aide to the RF design engineer, technician, radio amateur, and experimenter. **$15.00**

AR2960 **Transmission Line Transformers (2nd Ed.)** *by Dr. Jerry Sevick W2FMI* Practical designs and specific information on construction techniques and sources of material. **$20.00**

AR3851 **Hints and Kinks** Ideas for setting up your gear for comfortable, efficient operation. **$10.00**

ARRL License Manuals Complete FCC question pools with answers.

AR4181 **Technician Class**	$ 6.00
AR4688 **General Class**	$12.00
AR3274 **Advanced Class**	$ 8.00
AR3282 **Extra Class**	$ 8.00

AR3185 **The Satellite Experimenter's Handbook, (2nd Ed.)** *by Martin Davidoff K2UBC* Expanded and revised. Focusing on satellites built by and for the international radio amateur community. **$20.00**

AR2030 **Your Gateway to Packet Radio (2nd Ed.)** Tells everything you need to know about this popular new mode. **$12.00**

AR4645 **Satellite Anthology** The latest information on OSCARs 9 through 13 as well as the RS satellites, the use of digital modes, tracking antennas, RUDAK, microcomputer, and more! **$10.00**

AR4483 **Weather Satellite Handbook (4th Ed.)** *by Dr. Ralph Taggart WB8DQT* Expanded and revised to reflect today's weather-fax satellite technology. **$20.00**

AR4653 **Companion Software for Weather Satellite Handbook** 5 1/4" MS-DOS Floppy. **$10.00**

AR2083 **Complete DX'er (2nd Ed.)** *by Bob Locker W9KI* Learn how to hunt DX and obtain hard-to-get QSL cards. **$12.00**

AR3762 **Your QRP Operating Companion** No special rigs or expensive equipment to enjoy the excitement and challenge of low-power operating. **$6.00**

AR3169 **QRP Classics** Compilation of ARRL publications on building receivers, transmitters, transceivers, accessories. **$12.00**

AR4270 **FCC Rule Book** A must for every active radio amateur. **$9.00**

AR0356 **Morse Code: The Essential Language** *by L. Peter Carron, Jr. W3DKV* Expanded and revised in its 2nd edition. How to handle distress calls heard not only on the hambands but on maritime and aircraft frequencies. **$6.00**

AR4114 **Low Profile Amateur Radio** For the Ham who lives where antennas are frowned upon. From hiding your antenna to operating with low power. This books tells you how to get on the air using these techniques—and others—without calling attention to yourself. **$8.00**

AR3983 **Understanding Basic Electronics** An ARRL book. 314 big pages. This explains everything very simply: the math, DC, AC, transistors, even tubes (wow!). Dirt cheap at $17. Isn't it about time you understood the fundamentals? **$17.00**

CODE TAPES

73T05 **"Genesis" $5.95**
5 wpm—This beginning tape, takes you through the 26 letters, 10 numbers, and necessary punctuation, complete with practice every step of the way.

73T06 **"The Stickler" $5.95**
6+ wpm—This is the practice tape for those who survived the 5 wpm tape, and it's also the tape for the Novice and Technician licenses. It is comprised of one solid hour of code. Characters are set at 13 wpm and spaced at 5 wpm.

73T13 **"Back Breaker" $5.95**
13+ wpm—Code groups again, at a brisk 13+ wpm so you'll be really at ease when you sit down in front of a steely-eyed volunteer examiner who starts sending you plain language code at only 13 per.

73T20 **"Courageous" $5.95**
20+ wpm Congratulations! Okay, the challenge of code is what's gotten you this far, so don't quit now. Go for the extra class license. We send the code faster than 20 per.

73T25 **"The Mind Boggler" $5.95**
25+ wpm Fiendishly generated by kindly old Uncle Wayne for hams with a strong need for self punishment. Once you've conquered 25 per let Unk know if you need a 50 wpm tape.

WAYNE WRITES

W61 **We The People *Declare War* On Our Lousy Government**—360p soft cover. This is Wayne's report to the New Hampshire Economic Development Commission explaining what the major problems are facing both New Hampshire and the country, and proposing simple, inexpensive solutions. Wayne proposes a simple way to have government departments happily cut their expenses by 50% within three years; how to cut the cost of incarcerating prisoners by over 90%; how to end welfare; how to reduce the deficit; how to cut medical costs and improve health care; how to cut school costs and improve schools. An absolute steal at $13.

W64 **20/20 Foresight**—Twenty 16p updates on the **Declare War** book—320p. Further proposals for solving critical American problems, such as a new approach to financing small businesses, how to finance Russia and other countries and make a profit doing it, the real dope on bioelectromagnetics, a new kind of polytechnical university, a new electronics technology, why Africa is in such a mess, why Perot bombed, how to have tuition-free universities, a plan for making Congress turn honest, etc. Plenty more. One of the best $10 you'll ever spend. Ridiculously priced at $10.

W65 **Submarine Life in WWII**—60p. Wayne's story of his adventures on the USS Drum SS-228 on five war patrols in the Pacific in 1943-45. What's it really like on a submarine when you're being depth charged? And what's the day-to-day life on a submarine like? Did you see the movie Das Boot? This is a collection of stories originally published in the *Drum Newsletter*. Exciting stuff and only $7.50.

W66 **Uncle Wayne's Caribbean Adventures**—96p. Wayne's adventures scuba diving all around the Caribbean, visiting ham operators, and sightseeing. If you're interested in how to travel economically, you'll get some great ideas from this. Wayne and his wife Sherry sure know how to travel economically. He starts out with his "Diving, the Wimp Sport." You'll love their visit to 11 islands in 21 days trip. A measly $7.50.

W67 **Uncle Wayne's Travels**—52p. Wayne travels to Russia, London, Aspen, St. Pierre, Munich, Vienna, Krakow, and Prague without it costing nearly as much as you might think. Cheap for you too, at $5.00.

ANTENNAS

UE220 **The Easy Wire Antenna Handbook** *by Dave Ingram K4TWJ.* Gives you all of the needed dimensions for a full range of easy to build and erect "sky wires." **$9.95**

WGP87034 **All About Cubical Quad Antennas** *by William Orr and Stuart Cowan* "The Classic" on Quad design, theory, construction, operation. New feed and matching systems. New data. **$11.95**

TAB3270P **Practical Antenna Handbook** *by Joseph J. Carr* Design, build, modify, and install your own antennas. **$26.95**

AR4734 **ARRL Antenna Book** The new 16th Edition represents the best and most highly regarded information on antenna fundamentals, transmission lines, design, and construction of wire antennas. **$30.00**

AR0194 **Antenna Compendium Vol. 1** Materials on verticals, quads, loops, yagis, reduced size antennas, baluns, Smith Charts, antenna polarization. **$10.00**

AR2545 **Antenna Compendium Vol. 2** Covers verticals, yagis, quads, multiband and broadband systems, antenna selection. **$12.00**

AR2626 **Companion Software for Antenna Compendium Vol. 2** 5 1/4" MS-DOS floppy. **$10.00**

AR4017 **Antenna Compendium Vol. 3** More verticals, yagis, quads, plus loops, arrays, mobile, direction finding, controlled currents, computerized, installation, overloads, plus 40 new articles for beginner's to advanced. **$14.00**

AR2618 **W1FB's Antenna Notebook** *by Dave DeMaw W1FB* Get the best performance out of unobtrusive wire antennas and verticals. Build tuners and SWR bridges. **$10.00**

WGP87107 **All About Vertical Antennas** *by William Orr* Comprehensive coverage of amateur communications. **$11.95**

WGP87042 **Beam Antenna Handbook** *by William Orr and Stuart Cowan* Everything you need to know about beam design, construction, and operation. **$11.95**

WGP87077 **Simple, Low-Cost Wire Antennas For Radio Amateurs** *by William Orr and Stuart Cowan* All New! Low-cost, multi-band antennas; inexpensive beams, "Invisible" antennas for hams in "tough" locations! New data. **$11.95**

AR2200 **Antenna Impedance Matching** *by Wilfred N. Caron* Most comprehensive book written on using Smith Charts in solving impedance matching problems. **$20.00**

AR0410 **Yagi Antenna Design** *A Ham Radio* series polished and expanded by Dr. Lawson. **$15.00**

AR2995 **Reflections** will help dispel the half-truths and outright myths that many believe are true about transmission lines, standing waves, antenna matching reflected power and antenna tuners. **$20.00**

AR3118 **Reflections**—Software for IBM 5-1/4" **$10.00**

UHF/VHF/PACKET

TAB3222 **The Packet Radio Handbook (2nd Ed.)** *by Jonathan L. Mayo KR3T* "...the definitive guide to amateur packet operation."—Gwyn Reedy W1BEL **Only $16.95**

20N019 **U.S.Repeater Mapbook** *by Robert Martin* The Guide for traveling radio amateurs. **$9.95**

AR3959 **Your Packet Companion** Perfect for the packet newcomer. **$8.00**20N019 **U.S. Repeater Mapbook** *by Robert Martin* The Guide for traveling radio amateurs. **$9.95**

TP001 **The Basic Guide to VHF/UHF Ham Radio** *by Edward M. Noll* Provides a first rate introduction to the 2.6 and 1.25 meter bands as well as 23, 33, and 70cm. **$6.95**

AR3878 **Your VHF Companion** Explore the fascinating activities on the VHF bands, FM and repeaters, packet, CW & SSB, Satellites, ATV, transmitter hunting and more. **$8.00**

03R02 **RTTY Today** *by Dave Ingram K4TWJ* Most comprehensive RTTY guide ever published. **$8.50**

BOOKS FOR BEGINNERS

02D42 **Digital Novice** *by Jim Grubbs* Geared to make you a more knowledgeable participant. **$8.50**

W5GWNC **Technician Class License Manual: New No-Code** *by Gordon West* This book covers everything you need to become a Technician Class Ham. Every question and answer on the examinations is found in this one book. FCC Form 610 application. **$9.95**

01A87 **Shortwave Listener's Antenna Handbook** Primer antenna theory. **$13.95**

AR4432 **W1FB's Help for New Hams** *by Doug DeMaw W1FB* Complete for the newcomer. Put together a station and get on the air. **$10.00**

AR2286 **First Steps in Radio** *by Doug DeMaw W1FB* Series of *QST* articles. **$6.00**

Uncle Wayne's Bookshelf Order Form

You may order by mail, telephone, or fax. All payments are to be in US funds. Allow 3 weeks for delivery.

Item	Title	Qty.	Price	Total
			SHIPPING	
			TOTAL	

Shipping: All US orders add $5.00 shipping—shipped UPS. (Please provide street address.)

Make checks payable to "Uncle Wayne's Bookshelf."

Foreign Orders: Choose one: ☐ surface shipping ☐ air shipping.
(Surface delivery may take 2 to 3 months.)

Note: The actual foreign shipping costs will be additional to regular shipping and handling fees.

Name _____

Street _____

City _____ State _____ Zip _____

TOTAL $ _____ ☐ Check/Money Order

☐ AE ☐ MC ☐ VISA $10 minimum for credit card orders

Card # _____ Expiration Date _____

Signature _____ Phone # _____

Telephone: (603) 924-4117 (800) 234-8458 FAX: (603) 924-8613 UW 01/95

Mail: Uncle Wayne's Bookshelf, 70 Route 202N, Peterborough, NH 03458

$5.95* For 2 Day Delivery
*Up to 12 lbs. in Continental USA

Call For Catalog
Ask For Ext. 22

1•800 426•2891

FAX (612) 786•6513

Call Today!

Phone Hours
M-F 8am-8pm
Sat. 10am-5pm
CST

MasterCard VISA DISCOVER

Alinco Coupons Expire 1/15/95

ALINCO ELECTRONICS INC.

KENWOOD

ICOM

NEW

This tiny dual bander now has an improved scan rate, larger keypad buttons and a transmit LED. The same great ergonomic design features CTCSS, DTMF, great audio and excellent sensitivity.

$389.95

NEW

New propagation modes and new contacts are yours on the 6 meter band with this new mobile from Alinco. It offers FM performance with 100 memories, handles unique splits, tone encode, time out timer and more.

$369.95

NEW

This slim line dual bander sports a dot-matrix LCD (for a perfect Alpha numeric display), 82 memories, non-volatile memory with ID, DTSS, DTMF & CTCSS V/V & U/U receive & "FET" power make this a winner.

$494.95

NEW

Icom does it again with a new radio worth the word "Great" utilizing DDS technology, 1 Hz of tuning resolution is displayed with VOX, RF gain, 100 watt 100% duty cycle, 101 memories, quick split auto antenna tuning with step function, dual CW ports and more stack up to a feature packed HF rig.

$1549.95

NEW

Here's the H.F. rig you've been holding out for! It features a full 100 watts output from 160 meters through 6 meters with a built in antenna tuner and power supply, VOX, PBT, RF Gain, 101 memories and more provides you with the latest features and fun.

$1919.95

SAVE $15 MORE

This 2 meter mobile sports all the features you need in this class transceiver. Power out is 50 watts with DTMF mic, CTCSS encode, bracket, hardware and power cord gets you set to go into a tight space.

SAVE $10 MORE

This easy to use dual bander is jam packed with special features like simultaneous dual band receive, detachable front panel, remote operation and much, much more.

Enjoy high performance communications plus go-anywhere convenience with the world's smallest 100w mobile HF transceiver. All modes and all bands complete this package.
• **Limited supplies**

$1059.95

This new 2 meter/440 MHz dual band is another star in a new product line up for Icom. Features include separate tuning, volume and squelch controls for each band, 100 memories, and high power output to make this competitively priced unit a real winner.

$599.95

This new satellite dual band all mode base is designed to provide critical performance with Icom technology. Competitively priced. Features include data port, 50 memories, TXCO, noise blanker, DDS, compact size and much much more.

$1629.95

Yaesu Coupons Expire 1/8/95

Hello Minnesota!
Hear us on KKCM 1530 AM
Saturdays, 10:00am-11:00am
Starting January 7, 1995

YAESU

SAVE $100 MORE

Fun's fun, but you can be very serious with this heavy duty competitor. Dual receivers, 200 watt output, 99 memories and 108 dB dynamic range gives you the performance edge.

The FT-900/AT is a revolutionary HF transceiver which answers the call for a truly practical mobile radio. Its unique remote-head construction allows installation where no other transceiver can be mounted. 100 watts, 100 memories, dual VFO's, IF Notch and many more features.

$1349.95

SAVE $50 MORE

This dual band mobile features 100 memories, cross band repeat, lighted keypad, built-in duplexer and a small footprint. Dual watch capability rounds out this 50/35 watt VHF/UHF transceiver. Packet ready.

SAVE $30 MORE

This new 2 meter mobile borrows its ruggedness from the FT-2400H while adding great new features such as advance track tuning, time out timer, A.P.O., 9600 bps option, 31 memories, the new "omni-glow" LCD display and more!

NEW

This new H.T. is the world's smallest dual bander. FET output, back lit keypad, V+V, U+U and U+V operating modes plus–menu guide, *Spectrascope*™, CTCSS encode, DTMF paging, 120 memories, cloning, SLS (ask) and so much more you have to hold and try it!
• **FT-51/38** $509.95

$489.95

SAVE $100 MORE

The new FT-990 combines the basic technical features of that top-of-the-line model with several new advances in both transmitter and receiver circuitry. Digital filter, 90 memories, wide dynamic range and much more!
• **FT-990DC** $1819.95

Satellite and all-mode 2m/70cm work gets exciting with this full-feature transceiver. Linked tuning, 12 unlink memories, 100 memories, and 2 optional modules offers band extensions for 6m, 220MHz, or 1.2 GHz operation.

$1819.95

SAVE $50 MORE

This new transceiver delivers the fun and performance you're looking for while staying on a budget! It has 100 watt output, 100 memories, DDS, IF Shift FET front end and a general coverage receiver.

Portable or mobile, this 2 meter all-mode transceiver delivers fun and function. The 25 watt linear amplifier clips on in place of an optional battery case to extend your operating horizon.
• **FT-690** 6m Txcr $689.95
• **FT-790** 70 cm Txcr $679.95

$579.95

SAV $50

The newest member of the dual band family. This handheld sports auto tone search, 82 memory channels, automatic power off, built-in VOX, dual in-band receive feature, built-in cross band repeat function and much more.
• **Limited to SOH**

$465.95
-$50.00
$415.95

Authorized Factory Warranty Center

We offer factory authorized warranty service for Icom, Kenwood and Yaesu. We service all makes and models. Our customers may send any product requiring service to us, and we will handle it for them. This is a one-stop service that keeps our customers having more fun than hassle in this hobby. If you need a custom cable for packet and don't have time to make it, let us do it for you. C.A.P. & M.A.R.S. mods are also available at reasonable rates to authorized hams only.

2663 County Road I, Mounds View, MN 55112
Metro: (612)786-4475 • Nat'l Watts: 1-800-426-2891 • FAX: (612)768-6513

Store Hours: M-F, 10:00 am-8:00 pm, Sat.: 10:00 am-5:00 pm
Phone Hours: M-F, 8:00 am-8:00 pm, Sat.: 10:00 am-5:00 pm

Not Responsible For Typographical Errors.

Call For Catalog Ask For Ext. 22

Expires January 1995

Radio City

Prices Subject To Change Without Notice.

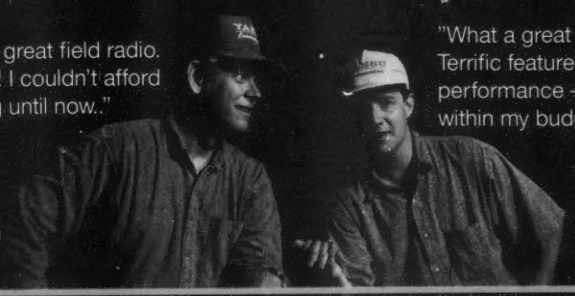
CIRCLE 153 ON READER SERVICE CARD

NEW

"What a great field radio. Mobile, too! I couldn't afford an HF rig until now."

"What a great price! Terrific features, high performance – and within my budget."

"Yaesu did it again!"



FT-840
Compact HF Transceiver

- Direct Digital Synthesis (DDS)
- Frequency coverage:
  RX: 100 kHz-30 MHz
  TX: 160-10 m
- IF Shift
- 100 Memory Channels (Independent TX/RX per memory)
- Twin Band Stacking VFOs
- FM* Repeater Operation Automatic 10-Meter Repeater Offset w/Selectable CTCSS Encode
- CW Reverse Feature
- Choice of Two Optional Antenna Tuners:
  FC-10 Matching External Antenna Tuner
  FC-800 External Remote Antenna Tuner
- **Accessories:** Contact your Dealer for full details.

* Optional

It's a small price to pay for such a wealth of features.

If you're trading up from an older rig, but have a budget, you want the most you can afford in top-notch HF. Then the FT-840 is for you. It's right on the money! Considering a mobile HF or field radio and doubt the quality and features of tiny HF rigs? Then the FT-840 is for you. It won't disappoint you!

Built to handle rigorous field operation, the new intense LCD display affords sharp visibility in bright sunlight. Die-cast heat sink and internal thermally switched fan keep the FT-840 running cool. Modular design circuit boards ensure operating efficiency – manufacturing excellence you'd expect in much higher priced radios.

For high performance, the FT-840 features a low noise front end that uses the latest in FET RF amplifier design. Two DDSs and magnetic encoder for silent, smooth tuning and fast switching. Twin band-stacking VFOs. And, automatic 10-m FM (optional) repeater offset with selectable CTCSS. Even two optional external antenna tuners to customize your rig.

Top of the line quality and features at a remarkably low price. Just what you'd expect from Yaesu! For high-tech performance, and a wealth of features that won't break your budget ask your dealer about the FT-840.

YAESU

Performance without compromise.℠

© 1993 Yaesu USA, 17210 Edwards Road, Cerritos, CA 90701 (310) 404-2700

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

MIL-SPECS/TOP SPECS!

TM-241A

FM MOBILE TRANSCEIVER

Pure and simple, the concept reads like this: "rock-solid performance with straightforward operation, at an affordable cost". And Kenwood's TM-241A (144-MHz) FM mobile transceiver symbolizes this perfectly.

Great looks and rugged construction are just the beginning. The TM-241A's user-friendly controls make mobile QSOs a snap, and a powerful 50-watt amplifier lets you work simplex with confidence or hit those distant repeaters. Reception specs are equally impressive: intermod characteristics have been improved* to reduce interference from strong adjacent band signals. Plus, there are 20 multi-function memory channels for programming combinations of frequency, sub-audible tone, and repeater offset.

So, if you're looking for true mobile performance, go back to the basics and reach for Kenwood's TM-241A.

Features

- 144-148 MHz TX, 118-174 MHz RX
- 50 watts RF output
- 20 multi-function memory channels
- Large LCD display with illuminated keys
- Full band scan, programmable band scan, memory scan with channel lock-out
- Time-operated & carrier-operated scan modes
- Built-in selectable CTCSS tone encoder
- Auto repeater offset
- Tone alert with elapsed time indicator
- DTSS for selective calling and paging (with optional DTU-2)
- Time-out timer
- Auto power-off with warning beeper
- Meets U.S. military standards for shock and vibration (MIL-STD 810C/D/E)*
- Modifiable for MARS/CAP use (permits required)

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745
• Customer Support Fax: (310) 639-5309
KENWOOD ELECTRONICS CANADA INC.

KENWOOD